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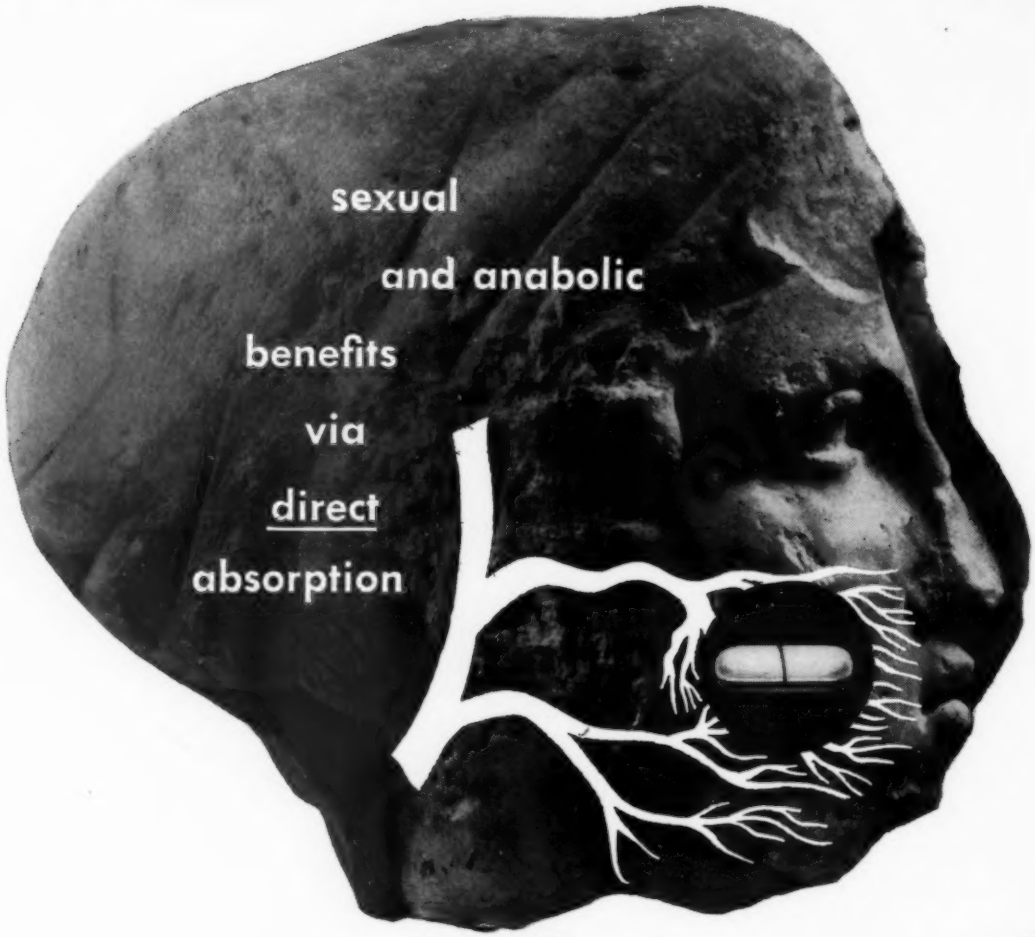

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DOES THE MODERN PACE REALLY KILL?*

WILLIAM P. SHEPARD, M.D.†

Metropolitan Life Insurance Company, New York, N. Y.

One of the penalties of living past middle age is the increasing number of deaths among one's friends and contemporaries. To many it is unduly depressing. Much of this undue depression could be prevented by a brief perusal of the mortality tables. Most of us reach the age of 50 without having learned these inexorable lessons. Nevertheless, deaths of contemporaries cause concern and give rise to a natural feeling that something in the environment must be the cause. The environmental factor most frequently suspected is work, or overwork, or the pace which our lost friend seemed to find necessary.

It is the purpose of this paper to review briefly the few statistics that are available which may help us 1) to decide whether the modern pace is really a killer, or whether work, per se, really kills; and 2) to suggest some directions in which our efforts to reduce deaths and disabilities due to stress might be successful.

DEFICIENCIES OF AVAILABLE STATISTICS

Unfortunately in this country we have no extensive long-term morbidity studies. Except for a few selected groups, studied for brief periods of time, we do not know all, or even the commonest causes of illness and disability, much less the trends and incidence in different sex and age groups and in different occupations and localities. Several good but brief sampling studies have been made and several are under way which will shed more light in this direction (1, 2, 3).

To make our problem more complex, there are in this country as yet no comprehensive studies on occupational mortality and morbidity. Here again, only a few observations have been made on limited groups over limited periods of time. On the other hand, we know a great deal about the recognized toxicologic hazards of industry. Nevertheless, we still do not know whether it is true that executives

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† Second Vice-President, Health and Welfare, Metropolitan Life Insurance Company; Chairman, Council on Industrial Health, American Medical Association.

TABLE 1

Death Rates per 1,000 from All Causes. White Males, Ages 45 and Over. United States, 1930–1952

Year	Age Groups			
	45–54	55–64	65–74	75 and over
1952*	9.6	23.1	47.7	116.6
1951*	9.7	22.7	48.9	121.8
1950	9.8	23.0	48.6	120.8
1940	11.4	25.2	54.0	137.8
1930†	12.3	25.5	55.1	133.6

* Estimated.

† Registration States.

in business die younger than farmers, or whether bankers live longer than physicians, or mechanics longer than lawyers.

More studies are needed along this line, and in some areas are already under way. We shall have to be patient, however, until we have more light on occupational mortality and morbidity than we have at present. When that light comes, we may then be able to discern causes of death and disability which merit our most earnest preventive efforts, or we may discern groups of individuals who are peculiarly affected by the stresses and strains of work.

VALUE OF AVAILABLE STATISTICS

Meanwhile there are readily available some simple mortality facts which deserve our attention. These are the best figures we have now, and must therefore form the basis of our present-day conclusions.

The first is shown in Table 1. Here we find death rates per thousand, from all causes, of white males, ages 45 and over, in the United States by decades from 1930 through 1950 and for the last two years available—1951 and 1952. Since 1930, white males in this country between the ages of 45 and 54 have shown a marked progressive reduction in total death rates. The same is true, though to a slightly lesser extent, at ages 55–64. There is a substantial reduction in death rates since 1930 at ages 65–74. Even for ages 75 and over there has been a marked and progressive reduction in death rates among white males in this country since 1930.

In Table 2 we see substantially the same thing illustrated in a different way. This table shows the percentile distribution of deaths among white males by age groups over 45 in the United States for 1900, 1930 and 1952. It also reflects the aging of the population.

Thus it is clear that, despite our natural concern over loss of contemporaries after the age of 50, the death rate at ages 45 and over has declined steadily among white males over the last twenty-two years. The over-all picture, therefore, is not so bad as it may seem after reading the obituary columns.

If we now examine the trend in death rates from certain specific causes, we

TABLE 2

Percentile Distribution of Deaths Among White Males by Age Groups. United States, 1900, 1930 and 1952

Age Groups	1900*	1930*	1952†
All ages	100.0	100.0	100.0
Under 45	58.0	34.9	18.1
45–64	18.5	27.8	29.9
65 and over	23.5	37.3	52.0

* Registration States.
† Estimated.

TABLE 3

Death Rates per 100,000 from Specified Heart Diseases. White Males, Ages 45 to 74 Years. Metropolitan Life Insurance Company, Industrial Department, 1930 to 1953

	Diseases of the Coronary Arteries and Angina Pectoris			Other Diseases of Heart (Excluding Coronary Disease and Angina)		
	Age groups			Age groups		
Year	45–54	55–64	65–74	45–54	55–64	65–74
1953*	304.3	665.0	1,147.5	158.8	453.5	1,246.0
1950	280.5	575.8	897.6	198.9	538.3	1,430.3
1940	192.5	405.0	662.3	249.2	707.6	1,857.1
1930	68.0	133.0	205.3	289.5	793.3	1,806.9

* Not strictly comparable with earlier years.

may find more reason for alarm, bearing in mind however that even with a few specific causes showing marked increases, these increases are not sufficient to have increased the total death rates after age 45.

In Table 3 are shown death rates per 100,000 from specified heart diseases among white males, ages 45 to 74, between the years 1930 and 1953, based upon the mortality experience of the Industrial Department of the Metropolitan Life Insurance Company. The reason for the selection of these figures is that, in the last revision of the manual entitled "International Causes of Death" coronary disease is included under arteriosclerosis, whereas in the Metropolitan Life data, coronary disease is still distinguished from other diseases of the heart.

There are some startling disclosures with respect to diseases of the coronary arteries and angina pectoris. The death rates from these diseases at ages 45–54 have increased nearly five times since 1930. There is an almost equal increase at ages 55–64, and a slightly greater increase at ages 65–74. Thus it would seem that something is happening either in the environment or in the human organism which damages the coronary arteries much more frequently than twenty years ago.

In Table 3, however, if we examine similar figures for other diseases of the heart (excluding coronary disease and angina) we find in each age group a continuous downward trend. Even at ages 65–74 there is a reduction in death rates

TABLE 4

Death Rates per 100,000 from Cancer of the Respiratory System. White Males, Ages 45 and Over. United States, 1930–1950

Year	Age Groups			
	45–54	55–64	65–74	75 and over
1930*	10.3	19.3	25.5	20.6
1940	23.8	47.4	53.8	49.3
1950	39.0	95.6	118.7	107.4

* Registration States.

TABLE 5

Death Rates per 100,000 from Ulcers. White Males, Ages 45 and Over. United States, 1930–1950

Year	Age Groups			
	45–54	55–64	65–74	75 and over
1930*	20.2	27.8	32.0	37.8
1940	22.7	35.2	42.6	51.6
1950†	14.0	28.5	41.9	57.4

* Registration States.

† Not strictly comparable with earlier years.

from heart disease (other than coronary) of more than 30 per cent. Except for coronary disease, therefore, deaths from disorders of the heart in this group are decreasing rather markedly.

Another cause for concern is shown in Table 4, which lists death rates per 100,000 from cancer of the respiratory system among white males, ages 45 and over, in the United States, between 1930 and 1950. At ages 45–54 the increase is nearly fourfold. At ages 55–64 the increase is more than fourfold. At ages 65 and over it is nearly fivefold. Here again, we must focus attention on environmental and hygienic factors which may account for this surprising phenomenon. Improved diagnosis is undoubtedly a factor, but it is not sufficient to account for so great an increase in so short a time. Important as this is, however, it should be kept in mind that coronary disease takes nearly ten times as many lives as does respiratory cancer.

To return now to one of the diseases which might be most frequently considered a stress disorder, Table 5 lists death rates per 100,000 among white males, ages 45 and over, from gastric and duodenal ulcers during the period 1930 to 1950. Surprisingly, we find a consistent decrease in deaths of white males between the ages of 45 and 54. At ages 55–64, the rate is about steady, except for the rise known to be due to the increased stress of working males in 1940. At ages 65–74 there is a slight increase, and at ages 75 and over, a marked increase. These figures must be interpreted in the light of the possibility that undiagnosed malignant conditions were present, especially at the older ages.

We have seen, then, that white males over the age of 45 are not dying earlier

or faster than they used to. Except for coronary disease, heart disease is less of a killer than it used to be. There is, however, an alarming increase in deaths from coronary disease and respiratory cancer.

In the light of these and such other statistics as are available, there is little evidence of physical harm in work per se. There is more than a suggestion that what really counts in both morbidity and mortality is the individual's reaction to work. One man's meat is another man's poison. Added responsibility and authority may be a joyous challenge to one individual, and an overwhelming, damaging worry to another. There are so many factors which determine the individual's reaction toward his work that we do not have the time here, nor do I have the psychiatric skill to analyze them all. They well deserve our further attention and most careful study.

HEALTH OF EXECUTIVES

Considerable attention has been given in the literature of recent years to the health and longevity of executives. A summary of these studies may shed some light on the complex factors just mentioned.

In general, executives have certain physical characteristics in common. They tend to be an older group. It should be borne in mind that many are alive today, who fifty years ago would have died of the contagious diseases of childhood, of typhoid fever, or of tuberculosis. Their physical examinations by competent medical authorities disclose somewhat fewer physical defects than are commonly found amoung school children, but those which are disclosed may be more serious. Among many studies along this line is one by the Life Extension Examiners (4). This is mentioned merely because it is fairly recent and is typical of other similar studies. The Examiners found that 40 per cent of 3,000 executives had one or more physical defects; 710 were overweight; 450 had some abnormality in the electrocardiogram; 280 had uncorrected visual defects; and 359 had high blood pressure.

It is unnecessary to repeat here in detail the now commonly accepted relationship between overweight and cardiovascular-renal deaths (5). Persons 20 per cent or more overweight have a mortality almost 50 per cent higher than the average, and the excess mortality is chiefly due to cardiovascular-renal disease.

There are also certain psychologic characteristics which are generally, though not universally, found among executives. These were well summarized recently for lay consumption by William H. Whyte, Jr. in Fortune magazine (6). In a study of 221 executives, including company presidents, vice-presidents, and middle-management men, he found that executives in general are working as hard as they ever did, despite the fact that other workers long ago cut down their work week to forty hours or less; high income taxes have not removed the average executive's tendency to work long hours; even with the trend toward human relations and committee management, executives are subject to more tensions than ever before. The average man among this group works from forty-five to forty-eight hours a week; and on the average, he works four nights out of five. The majority devote at least two nights a week to business reading. Their

motivations are essentially the same as they have always been—self-expression, sense of competition, responsibility, prestige and, in some cases, fear. Despite this, 90 per cent of them disclaim the charge of their friends and family that they work too hard.

SUGGESTED REMEDIES

In view of these observations, together with an impression gained from many other psychologic factors, four suggestions are submitted, along lines which may produce worthwhile results in industrial medicine and in geriatrics.

1. The first is that we need better methods of selecting our executives and other leaders. Too often they are selected by the rule of thumb and too often are found wanting. The American Management Association is making some interesting studies in the development of leadership training, from which we might all benefit (7). With better methods of preparing individuals for leadership, and selecting those who have such ability, we may expect to reduce the unnecessary toll of the stress disorders.

2. With modern medical and psychologic guidance, there should be increasing skill in detecting those individuals who are peculiarly susceptible to stress. There seems little doubt that there is great variation between individuals in the ability to withstand prolonged stress.

3. More frequent access to skilled medical guidance will reduce the toll of strain (8). A modern medical department is essential to every industry. The well trained industrial physician, working closely with top management, is the key person needed to detect the early manifestations of the stress disorders. For the individual who proves to be especially susceptible to stress, relief must be provided quickly, even if it means demotion. Otherwise his health or life may be lost merely to "save face."

4. Finally, those of us interested in occupational and geriatric problems will profit by keeping abreast of the rapidly developing field of mental hygiene, attainment of emotional stability, and improvement of interpersonal relations. These are areas which are almost as important to geriatrics as to pediatrics. They cannot be neglected in the field of industrial medicine.

SUMMARY

Death rates from all causes for white males over the age of 45 in this country have shown a consistent and gratifying reduction over the past twenty years. The reduction has occurred in each decade.

Despite this over-all reduction, there has been a marked increase in death rates from coronary disease and from respiratory cancer over the past twenty years in this age group. There are 10 coronary deaths for 1 respiratory-cancer death.

The individual's reaction to work, rather than work per se, may be one of the most important factors in assaying and preventing the stress disorders.

Other lines of study and action which may prove fruitful to those interested in geriatrics and industrial medicine are: 1) better methods of selecting and

training executives, 2) identifying and quickly relieving the individual who is peculiarly susceptible to stress, 3) more and better medical guidance in all industries, and 4) full utilization of the newer knowledge on improving emotional balance and interpersonal relations.

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BILIARY-TRACT SURGERY IN PATIENTS PAST 60 YEARS OF AGE

MARK A. HAYES, M.D., PH.D.*

Department of Surgery, Yale University School of Medicine, New Haven, Connecticut

Biliary-tract disease is the commonest condition requiring abdominal surgery in the older age groups (1, 2). For this reason, it is wise from time to time to evaluate the results of the different forms of treatment employed in its management, lest a single plan of attack become too well entrenched in clinical habit and be detrimental to the welfare of the patient.

In the 24-month period, January 1, 1952 to January 1, 1954, 157 patients with biliary-tract disease (acute cholecystitis, chronic cholecystitis with or without stones, or choledocholithiasis) were treated on the Yale University Service of the New Haven Hospital. This report is based on this clinical experience.

CLASSIFICATIONS

In the presentation to follow, certain arbitrary gradings are made which should be clarified. Diagnostic reliability is based on a list of single points in the history and physical examination, which are essential to a correct diagnosis and which have been taken from a standard textbook of surgery (3); each patient is graded numerically on this basis. For comparison, three consecutive series composed of an equal number of patients with the same diagnosis but in the fourth and fifth decades of life were graded similarly.

The postoperative course of each patient was evaluated by a grading schedule from 4 plus to 1 plus. If the clinical postoperative course was characterized by the minimal reaction, *i.e.*, temperature elevation to not more than 100° F. and the use of a gastric tube and intravenous fluids for not more than two days, it was graded 4 plus. If the postoperative course involved a febrile response of 102° F. or higher and the use of a gastric tube and intravenous fluids for more than four days, it was graded 1 plus. The other grades of 3 plus and 2 plus were arbitrary divisions between these two extremes. If treatment required two or more operations, the postoperative course with the lower or lowest grade was assigned to that patient.

Complications arising from an operative procedure are designated as biliary and nonbiliary. Any complication of sufficient clinical consideration to merit coding on the hospital record, or a specific therapeutic program directed towards its treatment, was included. Biliary complications consisted of persistent biliary fistula, subdiaphragmatic or local abscess, and wound infection or disruption. Nonbiliary complications were those of pulmonary, urinary or vascular etiology.

* Associate Surgeon, New Haven Hospital, New Haven; Consultant in Surgery, Veterans Hospital, West Haven; Associate Professor of Surgery, Yale University School of Medicine; Director, Samuel C. Harvey Metabolic Unit, Yale University School of Medicine.

ACUTE CHOLECYSTITIS

Thirty-eight patients with acute cholecystitis were treated surgically during the 24-month period; of these, 20 were male and 18 female, virtually an equal sex distribution.

The spread of cases by decades of age is shown in Figure 1. Most cases occurred in the sixth decade, half as many in the seventh decade, and relatively few in the eighth decade.

The average duration of the attack leading to hospitalization and surgical treatment was about sixty hours for the group, with a range from twelve hours to twenty-five days (Fig. 2). No correlation between duration of symptoms and the surgeon's recorded evaluation of the extent of the inflammatory process was discernible. In some of the patients who had a very brief period of acute disease, the most severely destructive inflammatory process was found at operation; and, contrariwise, in some with the longest episodes recorded, the operative picture was that of a subacute, smouldering process, well localized to the gallbladder.

Figure 3 shows that in patients over 60 the usual diagnostic criteria for acute cholecystitis are not met with any reliability in most cases. When compared with

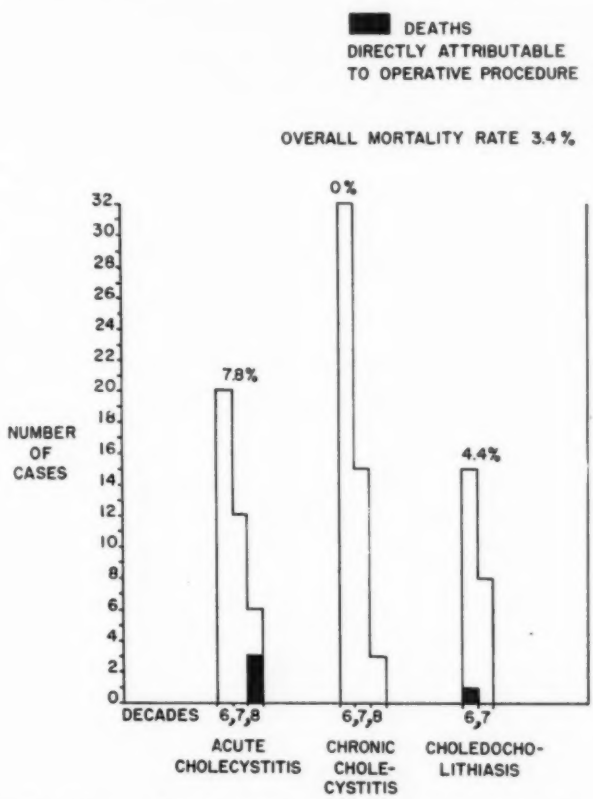


FIG. 1. Distribution by age decades of cases with a diagnosis of chronic cholecystitis, choledocholithiasis or chronic cholecystitis with or without stones. Mortality rates for each diagnosis top each column. Each solid area indicates an operative mortality.

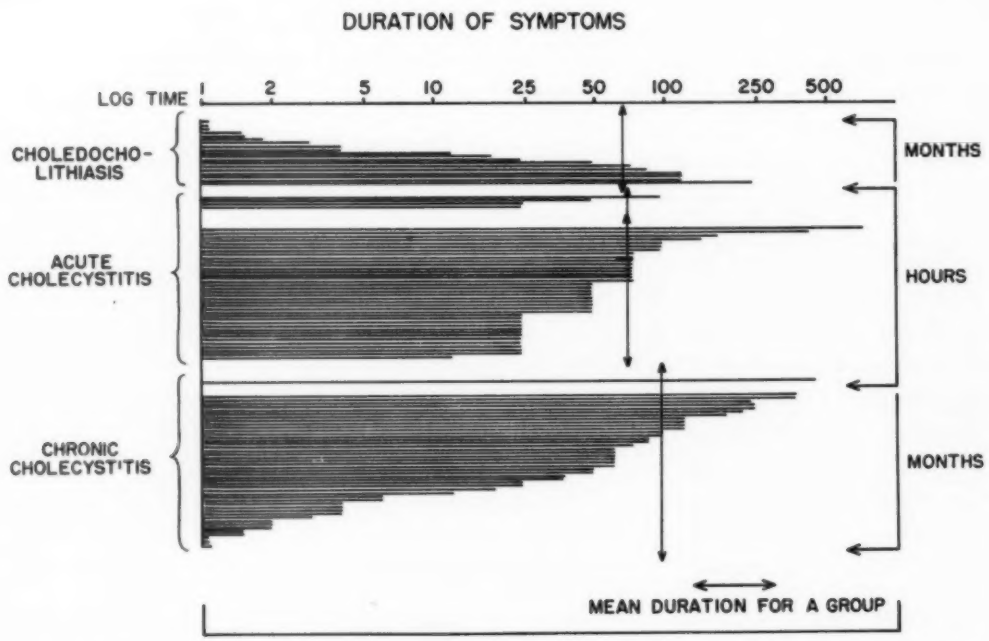


FIG. 2. Duration of symptoms for the patients treated by operation. Note that the time is presented logarithmically. The intervals are either months or hours, but on the same scale.

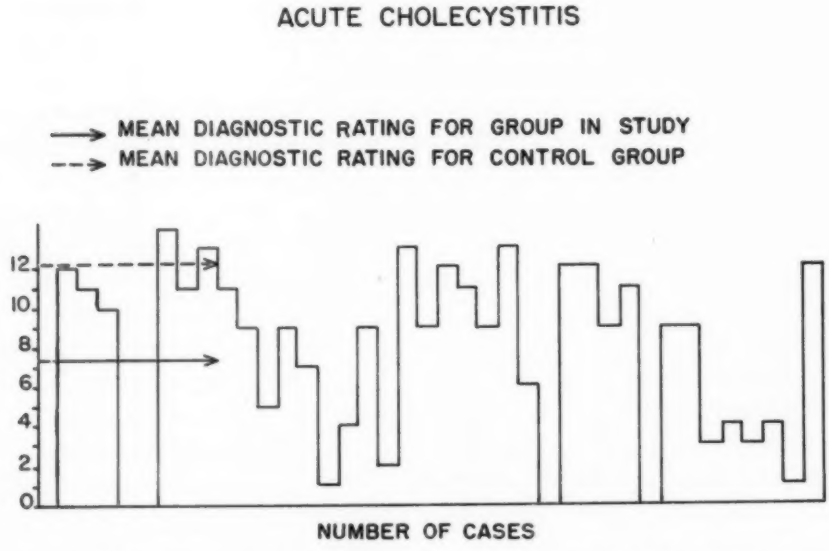


FIG. 3. Graphic presentation of the reliability of diagnostic indexes in each case. The arbitrary 12 points were selected from a standard textbook of surgery (3). The solid arrow is the mean rating for the patients past 60 years of age. The broken arrow for the same number of patients from the fourth and fifth decades.

FIG. 4. *G. V.* (A82010) male, aged 89.
Duration of attack: 96 hours.
Final diagnosis: Acute gallbladder disease with perforation and bile peritonitis.
Diagnostic rating 0/25.
History of abdominal distention and anuria.
Physical examination: T. 99, P. 100, R. 20. Marked distention of abdomen but no rigidity or spasm. Very mild generalized tenderness. No palpable masses or organs. Bowel sounds present but hypoactive. White blood cell count 6,800 per cu. mm. Abdominal paracentesis produced bile stained fluid, with which foam and Gmelin's tests gave positive results.
X-ray examination: A survey roentgenogram showed a moderate amount of distention of loops of the small and large bowels. Gas was visualized well into the sigmoid, suggesting ileus, although an obstructive lesion at the sigmoid colon could not be excluded.
Comment: Although there was perforation in this case of severe acute cholecystitis, there was minimal evidence of it.

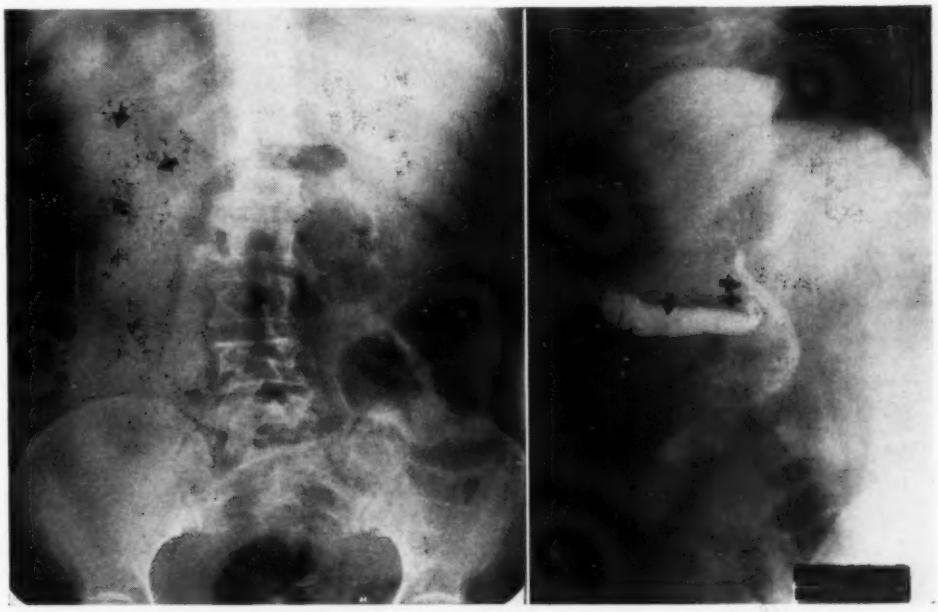
a consecutive series of patients with the same diagnosis but in a younger age group, there is considerable discrepancy in the reliability of the usual diagnostic indexes based on the history, physical examination and special laboratory aids (Fig. 4). One of the most useful diagnostic aids is the survey roentgenogram of the abdomen, which may show calcification in the region of the gallbladder (Figs. 5, 7a, 8a) or an enlarged gallbladder shadow with or without visible evidence of stones (Figs. 6a, 9).

In this series of 38 patients with acute cholecystitis, 40 per cent were treated by cholecystostomy with subsequent cholecystectomy and 40 per cent were

FIG. 5. *M. W.* (36-89-71) female, aged 69.
Duration of attack: 72 hours.
Final diagnosis: Acute cholecystitis and cholelithiasis.
Diagnostic rating 10/25.
History of onset with epigastric pain, nausea and vomiting. Suggestive past history of postprandial distress.
Physical examination: Right rectus spasm and a palpable, tender gallbladder.
X-ray examination: Large gallbladder calculus visible on survey roentgenogram, in area of maximum abdominal tenderness.
Operative findings: Free fluid with fibrin flecks. Hugely distended, red, thick-walled gallbladder, full of stones and covered with fibrin.
Comment: This case illustrates the value of a survey roentgenogram as an aid in the correct diagnosis of an acute abdominal condition.

treated by immediate cholecystectomy; the remainder required an exploration of the common duct at the time primary cholecystectomy was performed. The choice of procedure was determined by the surgeon's evaluation of the technical ease and safety with which a definitive operation could be carried out with the least risk to the patient.

Nonbiliary complications were encountered with about the same frequency, irrespective of the original diagnosis. The incidence in the acute cholecystitis group past 60 years of age was 18 per cent (Fig. 10). Over the same period of time the nonbiliary complication rate for all biliary-tract surgery on the Uni-



a b

FIG. 6. *A. F.* (39-49-09) female, aged 61.

Duration of attack: 24 hours.

Final diagnosis: Acute cholecystitis; cholelithiasis.

Diagnostic rating 12/25.

History of sudden onset of pain in right upper quadrant, with nausea and vomiting. Typical pain radiation.

Physical examination: Right upper quadrant tenderness, and a palpable mass.

X-ray examination:

(**a**) Scout roentgenogram taken before cholecystostomy, showing an enlarged gallbladder with calculi.

(**b**) Precholecystectomy roentgenogram (two months later). Injection of drainage tube shows residual stones in the gallbladder and common hepatic duct.

Operative findings: A very severe inflammatory process was found at the first operation and complete resolution at the second. Second operation was performed with the aid of operative cholangiography.

Comment: If cholecystectomy had been attempted at the time of the cholecystostomy, the common-duct stones would have been missed.

versity service, irrespective of age, was 4.3 per cent. The incidence of biliary-tract complications was 2.6 per cent, the lowest rate in the entire biliary surgical group reported.

The duration of the postoperative period of hospitalization is shown in Figure 11. The patients with acute cholecystitis treated by cholecystostomy followed by cholecystectomy spent more than twice as long in the hospital as those treated by cholecystectomy alone. In fact, of all the biliary operations performed, those involving the dual approach were associated with the longest hospitalization periods, even exceeding the hospitalization required for common-duct exploration following preoperatively diagnosed choledocholithiasis.

The clinical characteristics of the postoperative course of these patients was

a b

c d

FIG. 7

usually benign, as shown in Figure 12. As might be expected the postoperative course generally was not as uneventful as in patients having cholecystectomy for uncomplicated chronic disease, but it was decidedly superior to that in cases requiring common-duct exploration.

Associated diagnoses were very interesting. Two cases of acute cholecystitis developed in the hospital during a convalescent period for other surgical procedures (4); one occurred ten days following a radical neck gland dissection for carcinoma (recovery); and the other, four days subsequent to an emergency subtotal gastrectomy for massive hemorrhage from a duodenal ulcer (death due to the acute cholecystitis). In the 38 patients with acute cholecystitis treated surgically, a diagnosis of severe cardiac disease (clinical grades III or IV), requiring extreme caution in evaluation of risk, was confirmed in 2 instances and electrocardiographic changes indicating severe myocardial disease were reported in 10 instances. Hypertension, arteriosclerosis (severe), and hypertensive or arteriosclerotic disease of the central nervous system were clinically prominent in 14 patients.

The mortality rate for patients with acute cholecystitis treated by operation was 7.8 per cent. It should be emphasized that the deaths in this group directly attributable to the surgical procedure (including anesthesia) were all in patients in the eighth decade (Fig. 1). In the sixth and seventh decades of life operative mortality was zero; in the eighth it was 50 per cent. By way of contrast, during this same period, 46 patients past 60 years of age with acute cholecystitis were treated nonoperatively; there were 8 deaths—a mortality rate of 17.4 per cent.

Among the 38 patients with acute cholecystitis treated surgically there were 2 cases of carcinoma (1 adenocarcinoma of the cystic duct and 1 adenocarcinoma of the gallbladder), an incidence of 5.2 per cent. Both patients are living—one

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FIG. 7. *M. P.* (C32675) male, aged 67.

Duration of attack: 24 hours.

Final diagnosis: Acute cholecystitis, cholelithiasis and choledocholithiasis.

Diagnostic rating 5/25.

History: Onset of right upper quadrant pain with vomiting, twenty-four hours prior to admission.

Physical examination: Tenderness, spasm and rebound in right upper quadrant. No masses.

X-ray examination:

(**a**) Scout abdominal roentgenogram showing calcification, probably in the gallbladder.

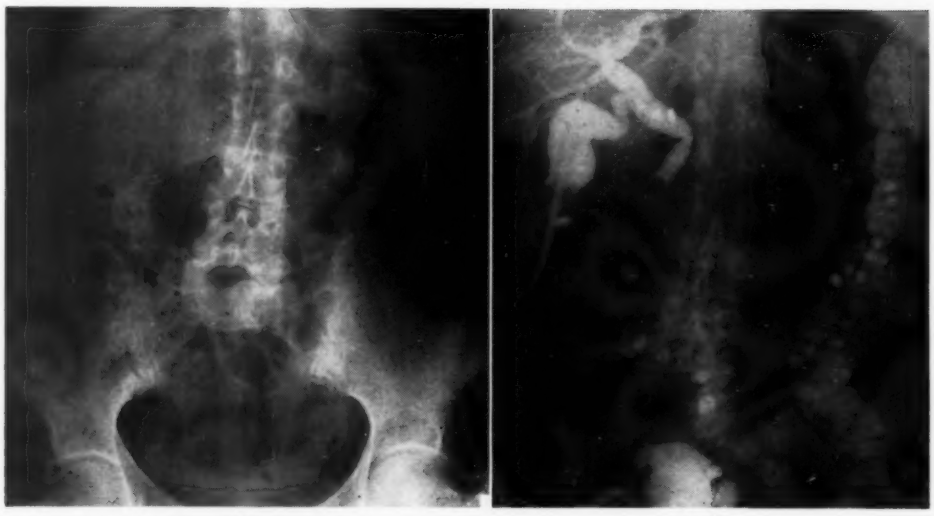
(**b**) Post-cholecystostomy injection, showing distal common-duct stone, which was unsuspected.

(**c**) Operative cholangiography, showing absence of common-duct stones.

(**d**) Cholangiography just before removal of the T-tube.

Operative findings: Acute inflammatory process; palpable stones in the gallbladder.

Comments: The series demonstrates 1) the usefulness of scout roentgenograms as an aid in the diagnosis of acute gallbladder disease; 2) the value of conservative surgical management of acute cholecystitis, since a common-duct stone would have been missed if cholecystectomy had been the first operation; and 3) the value of operative cholangiography in proving the adequacy of the removal of common-duct stones while the patient is still under anesthesia and the operative field is open.



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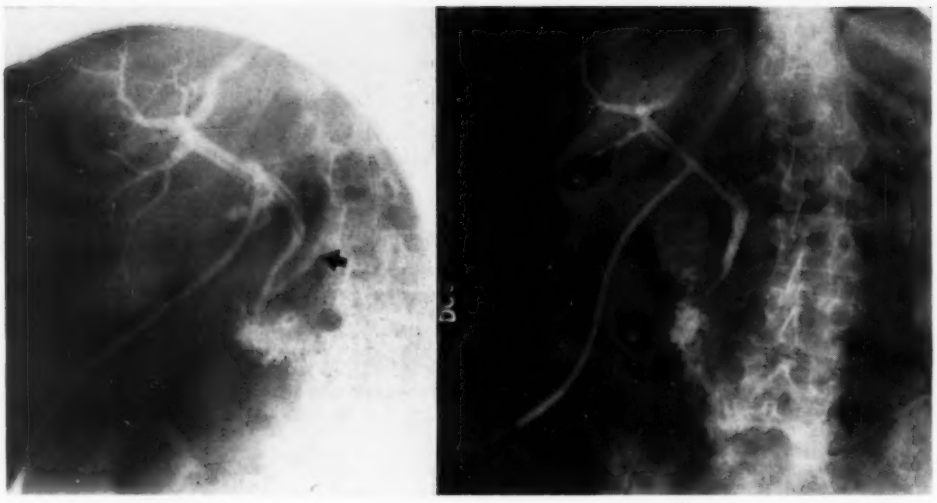

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FIG. 8. *N. S.* (10-24-73) female, aged 61.

Duration of attack: 12 hours.

Final diagnosis: Acute cholecystitis, cholelithiasis and choledocholithiasis.

Diagnostic rating 11/25.

History: Onset of deep mid-back pain accompanied by nausea and vomiting, twelve hours before admission.

Physical examination: Tenderness, spasm and rebound in the right upper quadrant. No masses or organs palpable.

X-ray examination:

(a) Scout roentgenogram, showing multiple calculi in an enlarged gallbladder.

(b) Post-cholecystostomy injection, showing distal common-duct stone.

(c) Operative cholangiography, showing free entry into the duodenum and no residual common-duct stones. The arrow indicates a reflux up the pancreatic duct.

(d) Normal cholangiogram just prior to removal of the T-tube.

Operative findings: Tense, distended and edematous gallbladder.

Comments: The series demonstrates 1) the value of survey roentgenography; 2) the importance of cholecystostomy as the first operation, if common-duct stones are not to be missed; 3) the value of operative cholangiography in confirming the adequacy of the operative procedure; and 4) the normal biliary tract prior to removal of the T-tube.

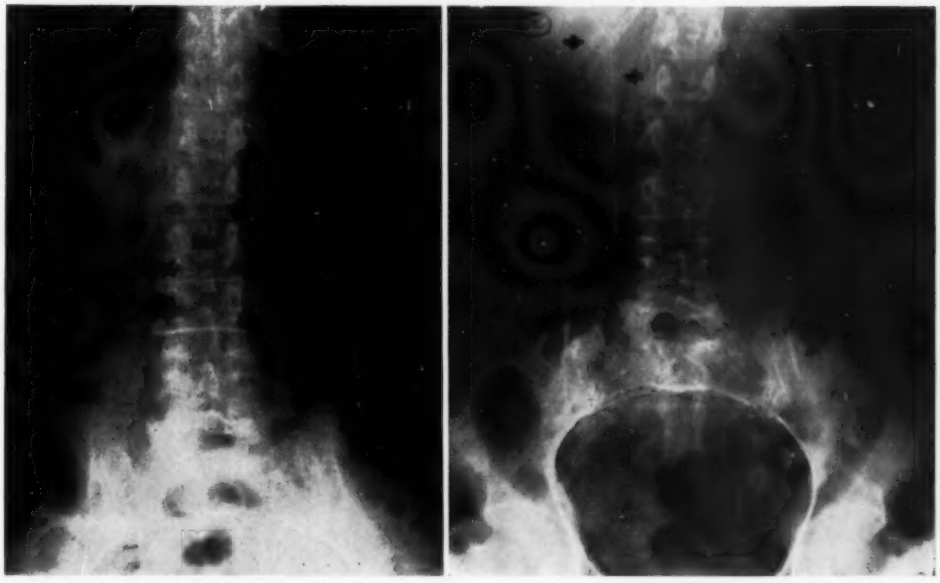

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FIG. 9. *D. G.* (37-37-93) female, aged 79.
Duration of attack: 24 hours.
Final diagnosis: Acute cholecystitis and cholelithiasis.
Diagnostic rating 6/25.
History: Sudden onset of right upper quadrant pain, nausea, and vomiting, twenty-four hours prior to admission; pain had typical radiation.
Physical examination: Palpable, very tender gallbladder.
X-ray examination:
(a) Film with patient in recumbent position shows only the calculus.
(b) Survey film with patient in upright position outlines the gallbladder, which is enlarged.
Operative findings: Enlarged, acutely inflamed gallbladder with calculi. Stone impacted in cystic duct. Common duct normal.
Comment: Demonstration of the effects of erect and recumbent positions on roentgenograms, in the diagnosis of acute abdominal disease.

twelve months after operation, apparently free of malignant disease, and the other less than a year after operation, with evidence of locally recurrent and metastatic neoplasm.

Figure 13 presents the general results of the treatment of acute cholecystitis. Of the patients surviving the operative treatment for acute cholecystitis, 1 had a poor result with definite residual disease due to neoplasm, 3 had minor complaints referable to the biliary system, and the remainder had excellent results with no evidence of residual disease, including 1 patient who had a malignant growth at the time of operation.

CHRONIC CHOLECYSTITIS

Fifty patients were operated on in whom the diagnosis was uncomplicated cholecystitis. These patients were principally in the sixth decade of life, but

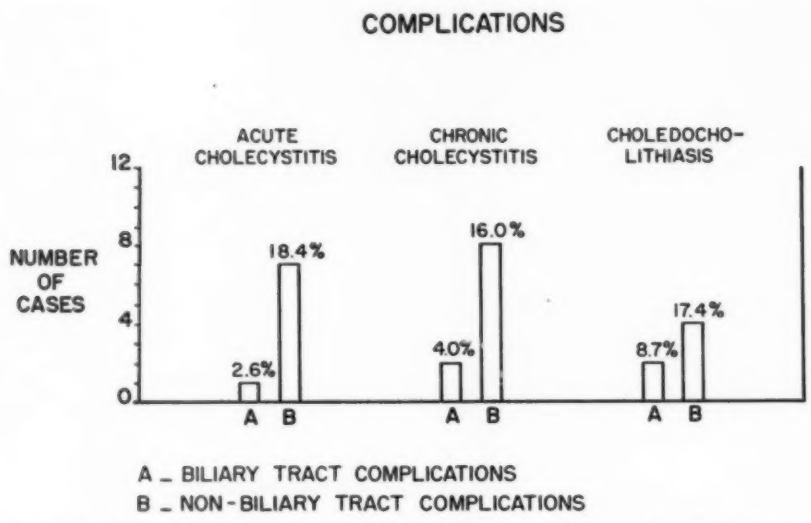

FIG. 10. Biliary and nonbiliary complication rates within each clinical group

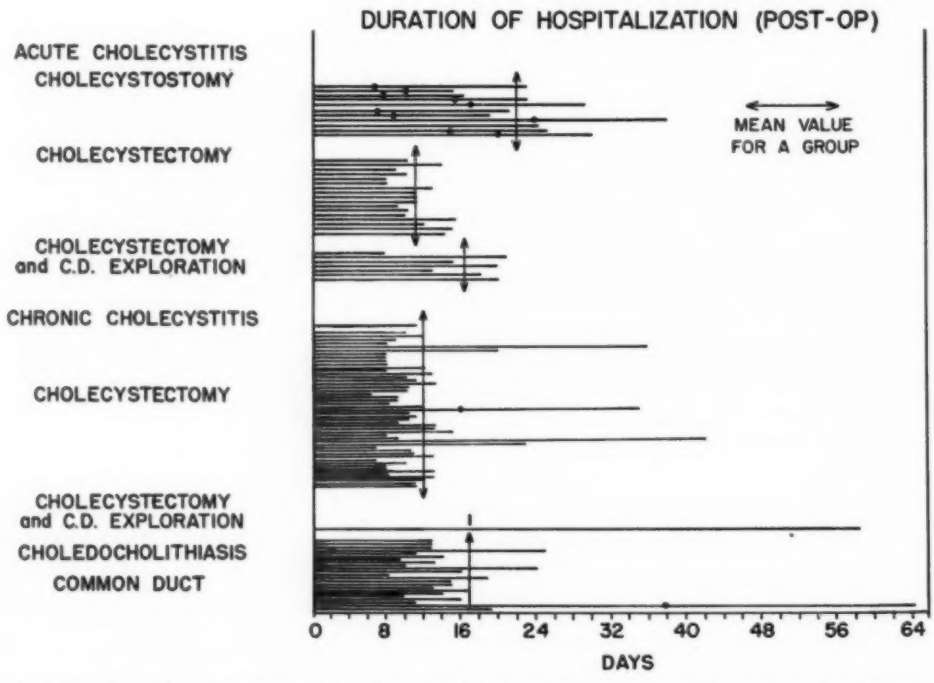

FIG. 11. Length of postoperative hospitalization in days for each patient in the entire group. The double arrow represents the mean stay within a group as determined by the operative procedure to which each patient was subjected.

about one third were in the seventh and eighth decades. There were 40 females and 10 males.

The mean duration of the symptoms characterizing this disease was about eight and a half years (Fig. 2). This is important when it is noted that the mean

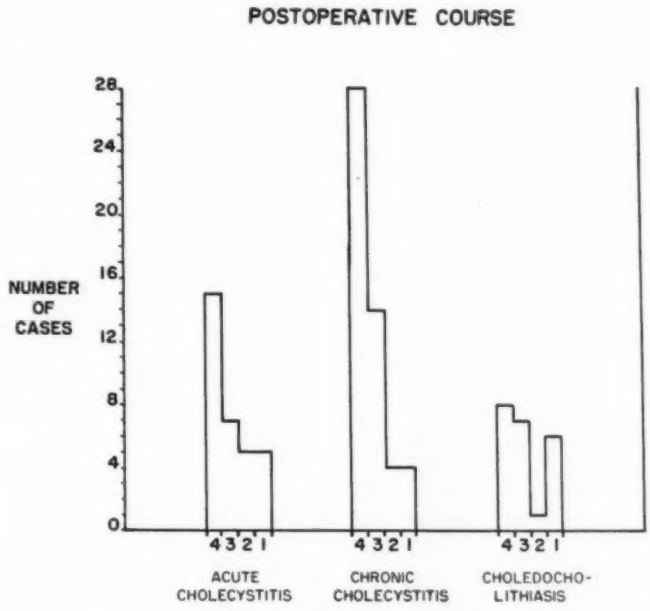

FIG. 12. Postoperative course for each group, arbitrarily determined (see text for details).

age for the group was about 68 years. Fully realizing that many patients with chronic cholecystitis are maintained satisfactorily on a medical program, it would be advantageous, nevertheless, to offer surgical relief of chronically recurring disease at an earlier age.

The accuracy of diagnostic indexes for this disease is far better than for acute cholecystitis (Fig. 14), when compared with results in a younger age group. An interesting diagnostic point is illustrated in Figure 15, which shows a tremendously enlarged gallbladder, demonstrated by routine examination, in a case with the typical history of chronic cholecystitis. The pathologic picture in this case was that of an adenocarcinoma of the cystic duct, the only malignant neoplasm in this group (an incidence of 2 per cent). Treatment for chronic cholecystitis in these patients consisted of cholecystectomy. Common-duct exploration was carried out in 5 instances (10 per cent) for findings suggesting disease in that location not suspected prior to operation; the results were negative in all cases.

The nonbiliary tract complications in the patients with chronic cholecystitis occurred with about the same frequency as in the over-all group (Fig. 10). Biliary-tract complications, however, were twice as frequent as in the patients with acute cholecystitis but only half as frequent as in those with common-duct disease.

As might be expected, this group of patients had the shortest hospitalization (Fig. 11), with an average stay of twelve days postoperatively. Excluding the prolonged convalescence of the patients with severe complications, the customary postoperative stay in the hospital was from eight to ten days. The postoperative

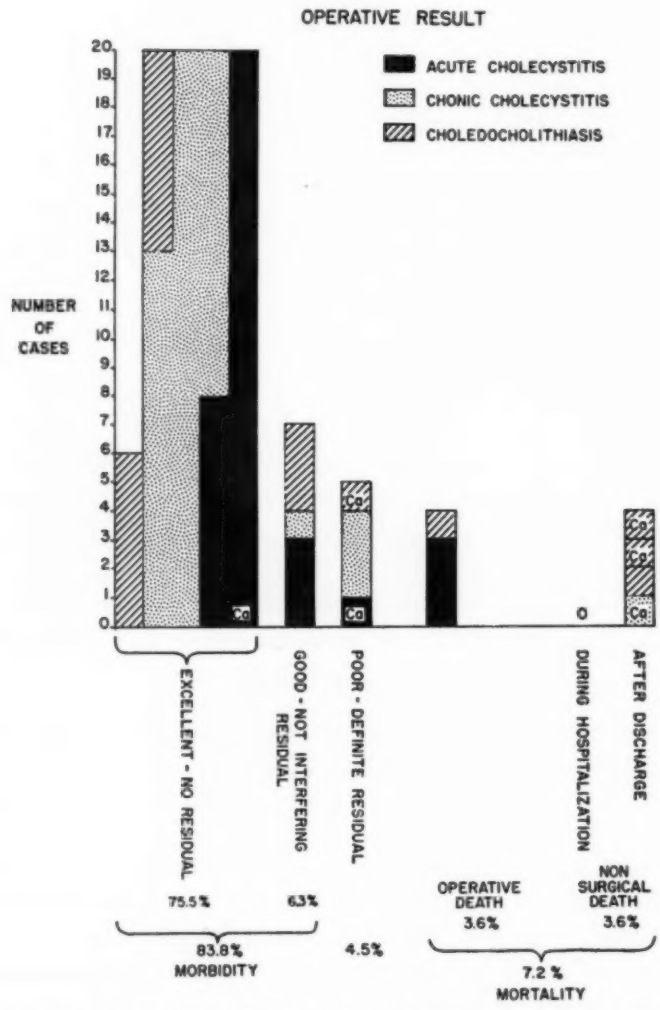

FIG. 13. Operative results. Morbidity and mortality (operative and delayed) for the entire group, classified according to preoperative diagnosis.

course was distinctly more benign (Fig. 12); more than half the patients had a completely uneventful convalescence and an additional quarter of them showed only minor deviations from an asymptomatic recovery.

Since the patients operated on for chronic cholecystitis represented less of an emergency than the patients treated for acute cholecystitis, the serious nature of associated diseases is less striking. Nevertheless, moderate degrees of cardiovascular-renal disease were present in this group; significant hypertension was recorded in 15 instances; electrocardiographic evidence of myocardial damage in 20; and Grade III or IV heart disease in 6. Proven borderline renal disease was noted in only 1 patient. Senile emphysema of a degree severe enough to assume clinical significance was noted only twice.

Among the 50 patients treated operatively for chronic cholecystitis there was no death directly attributable to the surgical procedure (Fig. 1). One death

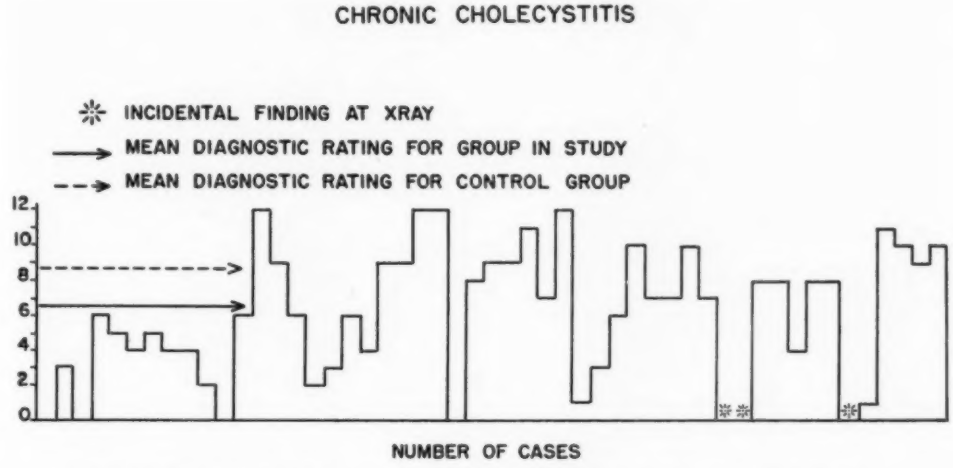

FIG. 14. Reliability of diagnostic indexes in chronic cholecystitis (*cf.* Fig. 3)

occurred after discharge from the hospital (Fig. 13) and was related to the progress of a malignant neoplasm of the gallbladder found at the time of operation. Of the 50 patients, 3 had definite residual complaints referable to the biliary tract (incidence, 6 per cent), 1 had a good result (incidence, 2 per cent) and the rest had excellent results from the surgical management of chronic biliary disease.

There were 3 unsuspected cases of neoplasm among the 50 patients with uncomplicated chronic cholecystitis treated by operation—an incidence of 6 per cent. Of these neoplasms, 1 (2 per cent) was malignant and resulted in death after discharge; 2 (4 per cent) were benign and have shown no clinical sequelae at this time.

CHOLEDOCHOLITHIASIS

During the period of time designated for this study, 23 patients were admitted to the surgical service with a diagnosis of choledocholithiasis. Two thirds of these were in the sixth decade of life and one third in the seventh decade. The usual sex ratio was not manifest in this group, in which the ratio was 2 females to 1 male. The mean duration of symptoms referable to the biliary system (but not to obstruction of the common-duct) was about six years (Fig. 2), with a range from about one month to twenty years. The specific period relating to the complication of chronic cholecystitis by common-duct disease averaged two weeks, ranging from three days to nearly a month.

In general, the indexes for specifically diagnosing common-duct disease were relatively reliable when compared to the situation in a similar group of patients in a younger age range (Fig. 16). There was considerable individual variation but usually an accurate preoperative diagnosis was possible, before any detailed diagnostic procedures were carried out.

All but 6 patients were treated surgically by cholecystectomy and common-duct exploration. Two patients in whom an unsuspected malignant neoplasm involving the hilum of the liver was found were subjected to biopsy only; a

FIG. 15. *E. M.* (A12932) female, aged 65.
Duration of attack: 1 month.
Final diagnosis: Adenocarcinoma of the cystic duct.
Diagnostic rating 3/27.
History: Constant aching and soreness in right upper quadrant for one month.
Physical examination: Palpable nontender gallbladder.
X-ray examination: Largest gallbladder of this series, with displacement of duodenum and hepatic flexure of the colon.
Operative findings: Tremendous, thin walled gallbladder; no stones. Induration at the cystic-duct area.
Comment: Roentgenogram suggested hydrops of the gallbladder, but at operation the gallbladder was normal in texture, indicating a noninflammatory obstruction.

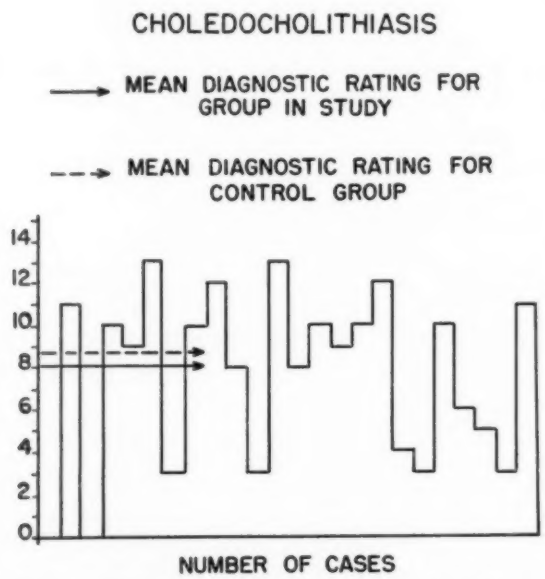

FIG. 16. Unreliability of diagnostic indexes in choledocholithiasis (*cf.* Fig. 3)

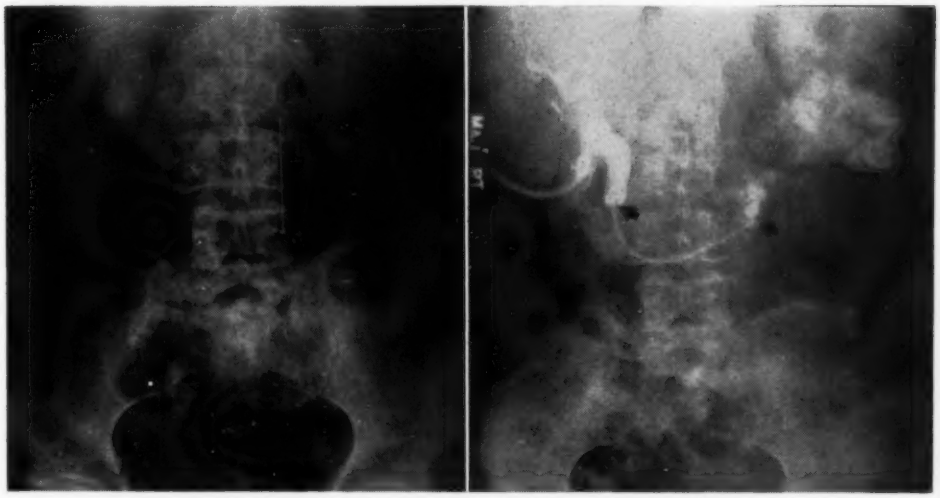

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FIG. 17. *V. M.* (C36522) male, aged 67.

Duration of attack: 24 hours.

Final diagnosis: Chronic cholecystitis, cholelithiasis and choledocholithiasis; distal common-duct stricture secondary to acute exacerbation of chronic pancreatitis.

Diagnostic rating 3/27.

History: For the preceding two or three months had had vague upper abdominal distress. Twenty-four hours prior to admission severe pain developed; it was localized to the right upper quadrant and there was associated nausea and vomiting.

Physical examination: The patient was jaundiced. Tenderness and rebound were noted in the right upper quadrant and the gallbladder was palpable. Liver function tests gave results characteristic of obstructive jaundice; the serum amylase level was 2,044 units/ml.

X-ray examination:

(**a**) Survey roentgenogram suggesting calculi in the gallbladder.

(**b**) Postoperative cholangiogram illustrating long arm of T-tube through the site of the sphincterotomy into the duodenum.

Operative findings: (After medical management, associated with a fall in the serum amylase level to 17 units/cc.) Diffuse calcification of pancreatic fat necrosis. Dilated common duct with distal stricture and no stones. The operation was sphincterotomy.

third with malignant tumor of the middle third of the common duct was treated by cholecystojejunostomy. In this last case, the patient had been told twenty-two years previously that she had cholelithiasis, and the disease had been symptomatic over the intervening years. Two additional patients required sphincterotomy in addition to cholecystectomy and choledochotomy, because of impenetrable distal common-duct strictures (Fig. 17). The sixth patient of this group required an Allen type of choledochojejunostomy as the final attempt to correct a common-duct injury encountered during cholecystectomy for acute cholecystitis two years before.

The nonbiliary complications were of about the same frequency as found in association with acute cholecystitis and chronic cholecystitis (Fig. 10), namely, 17.4 per cent. Biliary complications were in sharp contrast. They were twice as

FIG. 18. *C. A.* (39-42-04) male, aged 77.

Duration of attack: 48 hours.

Final diagnosis: Chronic cholecystitis, cholelithiasis, and choledocholithiasis.

Diagnostic rating 2/25.

History: Onset, 48 hours previously, of dull mid-epigastric pain, followed by a severe chill.

Physical examination: Findings essentially normal.

X-ray examination: Cholangiogram showed nothing abnormal in the immediate postoperative period, but two months later showed multiple duct stones.

Operative findings: Chronic gallbladder disease; normal sized common duct, but exploratory operation performed, because of febrile course; evacuation of many stones and much sludge.

Comment: Three important diagnostic tests were never satisfactory in this patient, namely, ductal pressures, bile culture, and cholangiography before removing the choledochal tube. (In this instance the tube was permanent.)

common as in chronic cholecystitis and four times as common as in acute cholecystitis (8.7 *vs.* 4.0 *vs.* 2.6 per cent) (Fig. 10).

The average period of postoperative hospitalization for patients with common-duct disease was about sixteen days (Fig. 11), which was about the same as for patients in whom the condition diagnosed as acute cholecystitis and treated by cholecystectomy necessitated an accompanying common-duct exploration. It was shorter than the total hospitalization period required when acute cholecystitis was treated by cholecystostomy and subsequent cholecystectomy.

About one third of patients operated on for common-duct disease had an uncomplicated convalescence (Fig. 12); in two thirds there were varying degrees

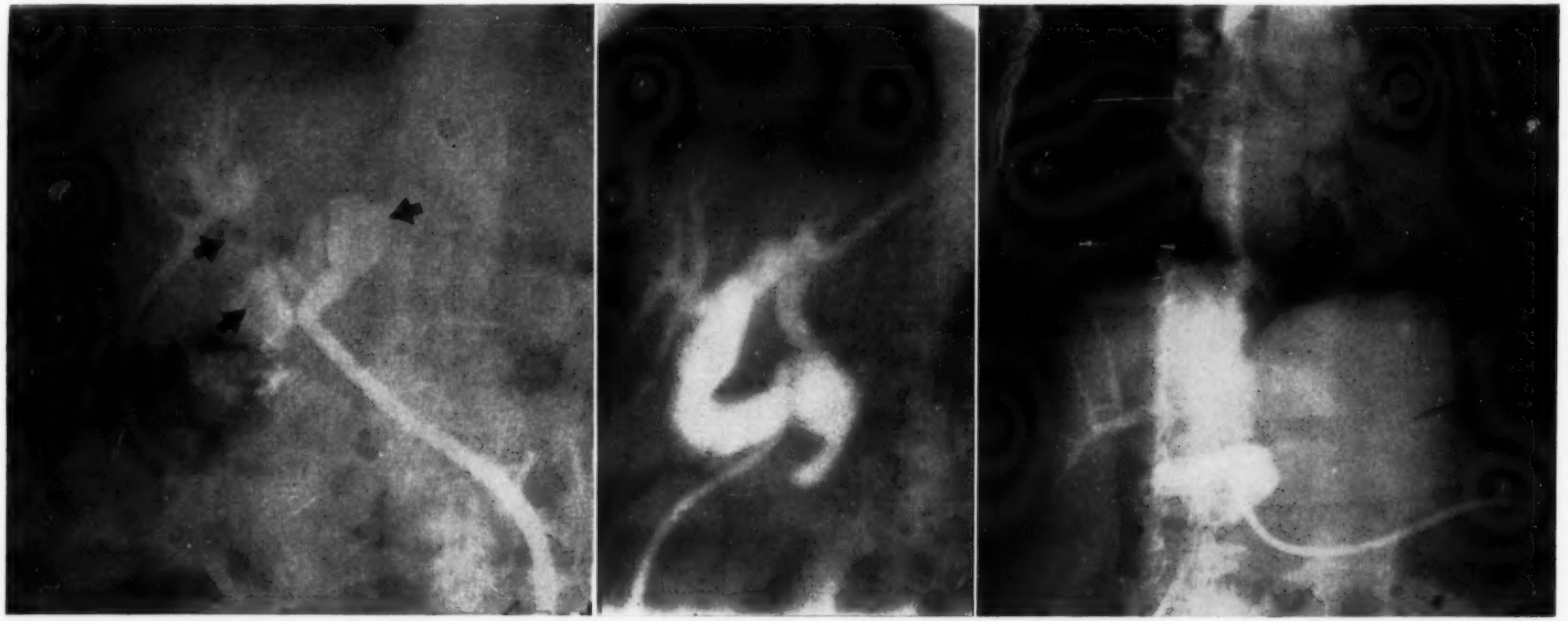

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FIG. 19. *R. R.* (38-52-86) female, aged 78.

Duration of symptoms: 2 years.

Final diagnosis: Chronic cholecystitis, cholelithiasis and choledocholithiasis, following cholecystostomy.

The patient had undergone a cholecystostomy elsewhere for acute cholecystitis two years prior to present admission. She was admitted twice and discharged because she was considered too poor a risk; she had recurrent attacks of biliary colic, cardiac angina, and cholangitis.

During the final admission:

(a) Results of injection, showing multiple residual stones in the gallbladder and common duct.

(b) Operative cholangiography (after cholecystectomy), showing a dilated duct system without residual stones.

(c) Results of cholangiography repeated just prior to removal of the T-tube (see text for additional clinical data.)

FIG. 20. *P. G.* (A57053) male, aged 64.

Duration of symptoms: one year.

Final diagnosis: Chronic cholecystitis and cholelithiasis; chronic pancreatitis with distal common-duct stricture.

Diagnostic rating 3/27.

History: The immediate episode was "heartburn" of eight weeks' duration; the patient had also had dark urine for eight days.

Physical examination: The gallbladder was palpable.

X-ray examination of the upper gastrointestinal tract showed an enlarged gallbladder.

Operative findings: Chronic cholecystitis, cholelithiasis, and a dilated common duct without stones but with intrapancreatic stricture from chronic pancreatitis.

Comment: Preoperatively there was a characteristic clinical picture of malignancy producing common-duct obstruction, but actually the condition was an obstruction due to chronic pancreatitis, and there was a good prognosis.

of serious illness during that period; in one third the troubles encountered were severe enough to constitute a serious threat to a successful outcome.

The associated nonbiliary-tract diseases which probably contributed significantly to the character of the postoperative course and undeniably influenced the surgeon's and internist's evaluation of the patient were: severe heart disease (Grades III or IV) in 6 instances; electrocardiographic evidence of severe myocardial damage in 9; proven borderline renal reserve in 1; and severe diabetes in 4 instances.

The mortality specifically related to the surgical procedure used (Fig. 1) was 4.4 per cent (1 death in the entire group). The over-all clinical results (Fig. 13) showed 3 deaths after discharge from the hospital—2 because of malignant biliary-tract disease and 1 because of progressive failure of the liver. The last patient (Fig. 18) showed evidence of re-formation of stones throughout the biliary tract,

and the choledochal tube could never be removed; his case was probably one of sclerosing cholangitis. One patient (Fig. 13) living with evidence of cancer was considered to have had a poor result, though she was relatively asymptomatic. Three patients had minor residual biliary complaints which did not interfere with normal activity; their condition represented a significant improvement over the preoperative physical state. In summary, in all but 8 cases of choledocholithiasis the patients became completely asymptomatic and were considered to have obtained excellent results.

Figure 19 illustrates features of an interesting case, applicable to the evaluation of operative risks. The patient was 78 years of age and had had a cholecystostomy for acute cholecystitis two years before being seen in this clinic. When seen, she presented the picture of a severe cardiac disease and diabetes. X-ray examination showed many residual stones in the common duct and gallbladder (Fig. 19a). Operation was performed for removal of the gallbladder and the stones from the common duct (Fig. 19, b and c). At the time of the removal of the tube from the common duct, the patient no longer required insulin and the dosage of digitoxin® had been reduced. A chronic invalid had been restored to relatively normal living.

In this group of 23 patients in whom there was a preoperative diagnosis of choledocholithiasis, there were 3 cases of malignant disease (2 of adenocarcinoma of the gallbladder, and 1 of adenocarcinoma of the cystic duct), an incidence of 13 per cent. It must be emphasized that, although in the preoperative diagnosis a malignant obstruction of the common bile duct might have been considered (Fig. 20), the emphasis had been placed almost entirely on stones as the obstructing agent.

DISCUSSION

The operative mortality for the entire group of patients over 60 years of age with biliary-tract disease treated surgically was 3.4 per cent. It is important to point out (Fig. 1), however, that operative deaths occurred exclusively in association with one or the other of two of the complications of chronic cholecystitis, namely, acute cholecystitis or choledocholithiasis, with operative mortality rates of 7.8 and 4.4 per cent. The operative mortality rate for uncomplicated chronic cholecystitis was zero. An analysis of the operative deaths in the group studied is presented in Table 1. It is readily apparent that the fatal outcome for these patients could be attributed to any one or a combination of the following factors: a complication of chronic cholecystitis, advanced age, inability to make an early diagnosis with any degree of certainty, threatening coexistent and unrelated disease, and severity of the biliary-tract disease. An obvious error in judgment was made in the case of Patient #3 (Table 1) by subjecting her to a five-hour difficult cholecystectomy and common-duct exploration when a cholecystostomy might have been life saving. Patient #5 (Table 1) had such a severely febrile course from cholangitis following a cholecystojejunostomy that it was deemed necessary to remove the focus of the severe infectious process at a second operation, which resulted in liver failure and death.

TABLE 1

Analysis of Surgical Deaths

Patient No. and Diagnosis	Age	Sex	Duration of Attack	Operation	Diagnostic Rating	Associated Diagnoses	Pathology
#1. Acute cholecystitis	81	M	48 hrs.	Cholecystostomy	12	Cardiac failure with edema; bundle branch block	Perforated gallbladder with generalized peritonitis.
#2. Acute cholecystitis	89	M	96 hrs.	None	0 (abdominal paracentesis revealed bile)	Bundle branch block, with fibrillation	Perforated gallbladder with generalized peritonitis.
#3. Acute cholecystitis	72	F	168 hrs.	Cholecystectomy with common-duct exploration	11	Hypertensive cardiovascular disease, Grade III	Thick, edematous gallbladder with many stones; dilated common duct but no stones. *Note:* Five-hour operation with several periods of hypotension. Death due to massive cerebral thrombosis.
#4. Acute cholecystitis	81	M	48 hrs.	Cholecystostomy	3	Arteriosclerotic heart disease, Grade III	Bile-stained peritoneal fluid. Intensely inflamed gallbladder; many small stones. *Note:* Acute cholecystitis developed 4 days after emergency subtotal gastrectomy for massive upper GI hemorrhage from duodenal ulcer.
#5. Choledocholithiasis	64	M	1 yr.	First operation, cholecystojejunostomy; second operation, common-duct exploration	3	Pancreatitis; severe liver damage	Enlarged gallbladder with stones. Pancreatic mass. Very febrile course subsequent to first operation. Died of liver failure 11 days after second operation.

About half the patients in the group studied who were treated for one of the complications of chronic cholecystitis gave a history fairly characteristic or strongly suggestive of previous chronic biliary-tract disease. More important, one fourth of the patients with complications had roentgen documented evidence of chronic cholecystitis with or without stones for varying periods of time prior to the development of the complication.

In the total number of cases reviewed, there was an over-all incidence for neoplasms of 7.2 per cent and an incidence for malignancy of 5.4 per cent.

Chronic cholecystitis with or without stones. In no way is it the intent of this discussion to recommend indiscriminate cholecystectomy for an asymptomatic nonfunctioning gallbladder or for an asymptomatic stone or stones within the gallbladder (5). As in all medical practice, the patient remains an individual problem and cannot be treated as a statistic. This study does serve to point out, nevertheless, that cholecystectomy for chronic cholecystitis, with or without calculi, can be offered with relatively little risk to an older patient who does not with relative ease remain asymptomatic on medical management. Such a medical program, when selected, should be undertaken with the physician being completely aware that complications may arise which will necessitate emergency or urgent surgical intervention. When a complication such as acute cholecystitis or choledocholithiasis intervenes, the mortality rate is high enough to consider the advisability of elective cholecystectomy for symptomatic uncomplicated chronic cholecystitis. Nearly half the patients over 60 years of age in this group were admitted with a complication of the disease and there was a resultant mortality rate of about 8 per cent; in the other half without complications, treated operatively, there were no deaths.

Choledocholithiasis. A patient with a diagnosis of choledocholithiasis presents a compelling situation, irrespective of age. Surgical intervention is mandatory and there is little thought to be given to procrastination. The differentiation of this condition from jaundice of hepatic or prehepatic origin is made with relative ease and comparative accuracy. The confusion exists in those cases in which neoplastic obstruction, either ampullary, distal-duct, or pancreatic, cannot be excluded. In the 23 cases studied, even in those which were operated on with a diagnosis of malignancy excluded by the best of clinical aids, the incidence of cancer was 13 per cent (3 cases, including 2 adenocarcinomas of the gallbladder and 1 of the common duct). No case of ampullary carcinoma was encountered and pancreatic carcinomas were excluded from the study.

When the common duct is explored, operative cholangiography (6) is rapidly becoming a routine procedure ranking equally with instrumentation of the biliary system to detect residual stones or strictures (Figs. 7c, 8c, 19b). Cholangiography may be carried out easily by means of a small polyethylene catheter inserted through the cystic duct prior to the opening of the common duct. It should be required after choledochotomy is completed with the T-tube in place.

The time of removal of a T-tube is of considerable importance. When inserted subsequent to an exploration of the common duct, three criteria must be met before its removal (Fig. 18): i) the cholangiogram (7) must show no residual

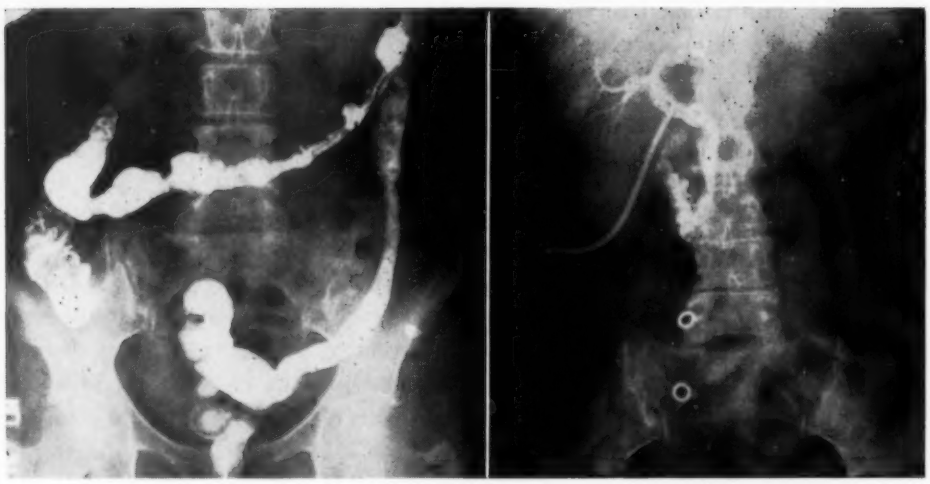

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FIG. 21. *M. C.* (46030) female, aged 62.

Duration of symptoms: 4 years.

Final diagnosis: Chronic cholecystitis, cholelithiasis and choledocholithiasis.

Diagnostic rating 3/25.

History of four years' distress and epigastric pain, radiating to back and relieved by narcotics. No qualitative dyspepsia; no suggestions of common-duct disease.

Physical and laboratory examination showed nothing abnormal. Liver function was normal.

X-ray examination:

(a) Cholecystography, showing a well visualized gallbladder with multiple stones.

(b) Postoperative cholangiography, showing normal duct system, no residual stones and prompt emptying into the duodenum.

Operative findings: Chronic cholecystitis with a dilated common duct.

Comment: There was no preoperative suggestion of the common-duct stones found at operation.

obstructive disease in the hepatic radicles and a freely uninterrupted flow of the radio-opaque medium into the duodenum (Figs. 7d, 8d, 21); ii) a bile culture must show no bacterial growth, and iii) the patient must have no pain or febrile response to a hydrostatic test, performed by merely raising an underwater drainage bottle to above the level of the biliary system, or by a manometer such as is employed in urologic cystometry.

If, for any reason, the T-tube must be left in place for a prolonged period of time (as subsequent to a repair of a stricture, persistent cholangitis or residual duct dilatation after common-duct stone removal), the patient is instructed to follow a definite program. The tube is kept clamped, except for sterile water irrigations twice daily by the patient, who is also instructed to use a mild saline cathartic every evening and a hydrocholeretic bile-salt preparation orally. Under this regimen, no T-tube has ever become blocked during the time it was to remain in place.

Acute cholecystitis. The problem of management of the patient with acute cholecystitis remains a matter of much discussion. It seems reasonable to sug-

gest that each patient should be considered a candidate for operation, whether such a procedure ultimately is carried out or not. In the group reviewed here there were 84 patients with this diagnosis: 46 were treated nonoperatively with a mortality rate of 17.4 per cent, and 38 were operated on with a mortality rate of 7.8 per cent.

The problem arises as to the selection of the operative procedure for acute cholecystitis which offers adequate treatment with the greatest margin of safety for the patient. It is the main point of this discussion to emphasize that the operative treatment must be individualized to meet the patient's requirements at the time. If it be made an invariable rule to remove an acutely inflamed gallbladder the results may often be lethal. On the other hand, pursuing a policy of never removing a gallbladder in acute cholecystitis (cholecystostomy, to be followed at a later date by cholecystectomy) subjects a patient to two operative procedures, with the attendant concomitant risks of each. Such a program also entails the economic considerations of extended hospitalization and its implications.

The patients included in this review, treated by operation, were carried on a carefully prescribed regimen: When the diagnosis is definite or fairly certain, several basal measurements are completed, *i.e.*, serum bilirubin and serum amylase concentrations, total white blood cell count, temperature and pulse, and a careful recording of the physical findings. Gastric suction, correction of dehydration, and administration of antibiotics are started. The basal measurements are repeated in from four to six hours. If improvement is clearly demonstrated, the patient is continued on such a program until there is complete subsidence of the acute episode; he is then discharged on a restricted fat (40 Gm.) diet and a hydrocholeretic preparation. Arrangements are made at this time for cholecystectomy after a three-months interval. If, however, no prompt improvement occurs or there is progress of the disease process, operative management is carried out.

The choice of anesthesia lies between the local type for very ill patients, and the general type for the better-risk patients. As to whether cholecystostomy or cholecystectomy is to be performed, the decision is made by the surgeon when he can visualize the ease and safety with which a definitive cholecystectomy may be accomplished (8, 9). With constant vigilance and being fully aware of the intricate and complex anomalies that may exist in the biliary-duct system (10, 12), it remains the surgeon's responsibility to do no harm. Damage to the common duct may occur very easily if the inflammatory process obscures either the normal structures or an anomaly. The incidence of common-duct stricture is related to cholecystectomy during acute cholecystitis in about 20 to 30 per cent of cases (13, 14). If the structures of the cystohepatic angle are not involved in the inflammatory process or are in the edematous stage of the acute process, so that there is no interference with adequate demonstration of the common hepatic, common and cystic ducts, and the cystic artery (and the patient's condition warrants the additional time requirement), definitive cholecystectomy may be advisable. If *all* these requirements are not met comfortably, cholecystostomy is by far the treatment of choice, to be followed by definitive chole-

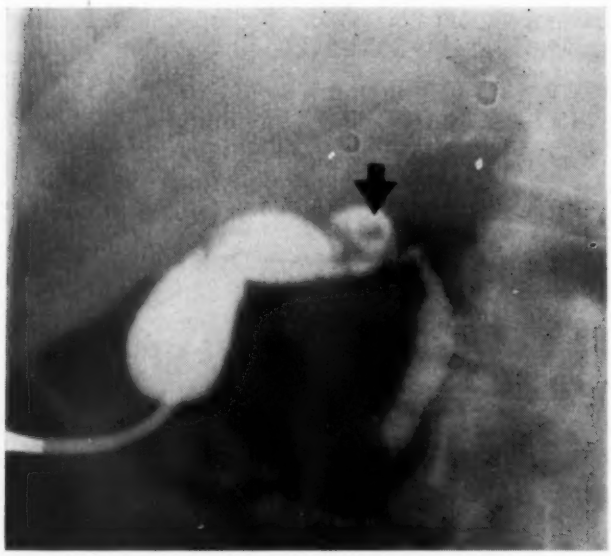

FIG. 22. *M. O.* (39-20-83) male, aged 63.
Duration of attack: 24 hours.
Final diagnosis: Gangrenous gallbladder; cholelithiasis.
Diagnostic rating 9/25.
History: Typical attack of acute cholecystitis occurred ten days following resection of mixed salivary gland of the parotid.
Physical examination: Tender, palpable gallbladder.
X-ray examination: Cholangiogram obtained after cholecystostomy and before cholecystectomy shows a stone impacted in the cystic duct; there is proximal constriction, but no interference with passage of dye into the duodenum.
Operative findings: Gangrenous gallbladder with much inflammatory change in the porta hepatis and hepatoduodenal ligament.
Comment: This is an illustration of the conservative management of acute cholecystitis. There was the possibility during cholecystectomy of leaving the stump of the cystic duct too long, thus retaining the stone.

cystectomy at a later date (usually eight to twelve weeks) (15). In the 11 cholecystostomies performed in our series, the surgeon was completely unaware of common-duct stones in 3 (27 per cent). These stones would have been left behind had the operation been primary cholecystectomy (Figs. 6, 7, 8 and 22). On the other hand, jaundice is common in acute cholecystitis and may lead to an unnecessary common-duct exploration, if cholecystectomy is made an invariable rule.

If cholecystostomy is the operation of choice, visualization of the biliary system is obtained prior to discharge from the hospital. If the roentgen examination shows a normal biliary-duct system, the cholecystostomy tube is cut, clamped and left in place until the time for cholecystectomy. If duct disease is present, the tube is left open to drain until the definitive operative procedure is undertaken.

SUMMARY

A complication of chronic cholecystitis is the most common abdominal surgical emergency occurring in patients past 60 years of age. The mortality rate for

cholecystectomy in uncomplicated gallbladder disease is very low, but when there are complications the rate is rather high. Thus, serious consideration should be given to the operative treatment of the symptomatic uncomplicated disease, and even more so when it is realized how frequently it is difficult to make the diagnosis of acute cholecystitis with certainty in the older patient.

There is no invariable formula for the operative treatment of acute cholecystitis. The operation should be tailored carefully to the patient's general condition and the local pathologic picture, keeping in mind the time-worn creed of the surgeon, "first of all to do no harm."

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THIRTY-THREE YEARS' EXPERIENCE IN THE MANAGEMENT OF ARTERIAL HYPERTENSION*

PAUL V. LEDBETTER, M.D.† AND EDWIN J. MORROW, M.D.

Houston, Texas

In the general process of aging, hypertensive disease affects in varying degree about 20 per cent of both men and women. Some families seem particularly susceptible to the development of this state, and occasionally the effects are devastating and uncontrollable. In this presentation we shall not inquire into the reasons for this background; rather, we shall concern ourselves with what should be done with and for these people after the disease has been acquired. Our views are based upon careful diagnostic records of over 50,000 patients observed during the past thirty-three years. For the past thirty years, the medical "hobby" of one of us (P. V. L.) has been cardiovascular disease and, in particular, hypertensive disease. The other (E. J. M.) has worked in the same group for five years. The incidence of hypertension among our patients, therefore, is greater than that found among patients in the average internist's office.

METHODS

Our studies have included not only the history, physical examination and usual laboratory tests, but also a consistent effort to evaluate the arterial system, cardiac status and kidney function by means of eyeground examinations, electrocardiograms, six-foot roentgenograms of the chest, and reasonably simple tests of renal function. We have also attempted to study the emotional life of the patient and its possible relationship to his hypertension.

Eyegrounds: The Wagener-Keith (1) classification was used for recording changes in the eyegrounds, as follows:

Normal fundus. All the retinal vessels are filled with blood; the veins and arterioles cross each other without any change in size or visibility; the arterioles are slightly smaller than the veins.

Grade 1 changes. Reduction in caliber of arterioles to half that of the veins; little, if any, indentation of veins at the arteriovenous crossings; increased light reflex of the arterioles; disc and retina normal.

Grade 2 changes. The arterioles have the appearance of copper wire and are reduced to one third the size of the veins; indentation of the veins, producing arteriovenous nicking; no traces of hemorrhage.

Grade 3 changes. The caliber of the arterioles is reduced to one fourth that of the veins; diminished light reflex from the arterioles; cotton-wool spots; retinal hemorrhages and increased arteriovenous nicking; disc may be blurred.

Grade 4 changes. The arterioles appear threadlike or colorless; cotton-wool spots and retinal hemorrhages are more pronounced; there is definite edema of the optic disc; veins are distended and tortuous; there are areas of degeneration.

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† Address: Suite 1603, Medical Arts Building, Houston.

On the whole, the eyeground findings are helpful in an evaluation of the patient's condition and the prognosis of his disease. For example, the sudden development of grade 3 eyegrounds indicates an imminent and unfavorable change in the course of the disease—one which calls for drastic treatment, either medical or surgical. Under careful management in the hospital, the process may at times subside even at this stage, as indicated by a reversion of the serious pathologic changes in the eyegrounds and an improvement of the cardiorenal status of the patient.

Renal function: The phenolsulphonphthalein dye test, the Mosenthal test and blood urea nitrogen determinations proved to be reliable guides to the extent of the kidney damage, especially when considered together and in conjunction with the chemical and microscopic findings in the urine. The results of the Mosenthal tests were rather impressive. When lumbodorsal sympathectomy was performed on patients with persistent low-gravity urine and a renal biopsy was made, the degree of hyaline degeneration in the glomerular tufts (pathologist's report) correlated with the level of urinary specific gravity. Lumbodorsal sympathectomy was usually unsuccessful in such patients, and prior to 1952 they failed to respond to medical management.

An intravenous pyelogram was always made if there was the lightest possibility of unilateral kidney disease, as well as before every lumbodorsal sympathectomy. The response to the phenolsulphonphthalein test during the first fifteen minutes was considered most significant. If as much as 15 per cent of the dye was excreted during this time and the blood urea nitrogen level was less than 20 mg. per 100 cc., the patient's condition was regarded as suitable for surgery. Benzodioxane was used for testing when pheochromocytoma was considered a possibility. Recently, we have been making tests with Regitine and histamine.

SURGICAL TREATMENT

We have never been satisfied with supradiaphragmatic or subdiaphragmatic sympathectomy in the treatment of hypertensive disease. In our experience, however, lumbodorsal sympathectomy has given satisfactory results in most of the carefully studied and selected patients. A few have undergone this procedure at their own request, even though advised that the result would be unfavorable or that the surgical risk would be serious, or both. All these patients recovered from the operation. Their blood pressure readings were not perceptibly affected, though most of the group reported that they felt better and were relieved of headaches. The success of lumbodorsal sympathectomy depends largely upon 1) the careful selection of patients, and 2) resection of the nerves from approximately the sixth dorsal through the first lumbar on one side and the second lumbar on the other side in men, and from the sixth dorsal through the second lumbar on both sides in women.

From the beginning of 1944 to the present time, lumbodorsal sympathectomy as outlined by Smithwick (2) has been performed for arterial hypertension in 116 of our patients, as follows: 2 in 1944, 10 in 1945, 18 in 1946, 20 in 1947, 28 in 1948, 20 in 1949, 12 in 1950 and 6 in 1951. No lumbodorsal sympathectomies

were performed in 1952 and 1953, and none thus far in 1954. These figures more or less parallel those reported elsewhere. Lumbodorsal sympathectomy has never been universally accepted, yet the procedure may change for the better the entire lives of some of these patients. This point is illustrated by the experience of one of our patients, a woman with diastolic hypertension which was discovered while she was pregnant, at the age of 27. After eight years, changes in her eyegrounds suddenly progressed from grade 1 to grade 2 plus (small hemorrhages in one eye). She then underwent a bilateral lumbodorsal sympathectomy. Now, four years later, her blood pressure is below the average normal. She keeps house and is a full-time school teacher.

According to the views of 7 surgeons and 8 internists, as summarized by Allen (3), it is probable that no additional technic of sympathectomy will produce better results than those currently in use, and it is logical to believe that if any further contributions are made to the solution of the problem of essential hypertension, they will be in the medical field. Until then, patients who have a reasonable prospect of benefiting from sympathectomy should not be denied the procedure, particularly if there has not been sufficient reduction in blood pressure during an adequate period of medical treatment, and provided no contraindications exist.

Total or subtotal adrenalectomy has not been employed by us and, so far, we do not believe we would consider it even for intractable hypertension. Following an appropriate operation for unilateral kidney disease in 2 of our patients (4) and for pheochromocytoma in 1 (5), previously high blood pressures returned to normal.

MEDICAL TREATMENT

Drug therapy. During the past few years, quite an array of hypotensive drugs has been studied in medical centers all over the world and, from the varied experiences reported, considerable dissatisfaction with their effects is apparent.

Almost two years ago we began treating hypertensive patients with *Rauwolfia serpentina*, as recommended by Wilkins (6). Later, we substituted for this drug its derivative, Rauwiloid.[1] The initial standard dosage is one tablet morning and night for a test period of two weeks. The tablet contains 2 mg. of the alkaloids and its therapeutic activity equals that found in approximately 125 mg. of the crude root. Thus far, we have not been impressed with a larger dose than four tablets daily.

All of our patients had funduscopic, cardiac and renal surveys, as well as general laboratory, roentgen and physical examinations. During the two weeks' test of Rauwolfia serpentina (or Rauwiloid), they were not restricted in any manner and did not report for blood pressure readings unless for a specific reason. Thereafter, a continued dosage of one tablet twice daily seemed adequate for some patients. We recall a 50-year-old surgeon whose blood pressure had been 180/110 for four years. By the end of four weeks of treatment with one and a half tablets of Rauwolfia serpentina daily, his pressure had dropped to 130/85. For the past eighteen months he has exhibited a definitely improved mental outlook and his

[1] Supplied by Riker Laboratories, Inc., Los Angeles, California.

life has been much happier and more successful. Apparently, merely knowing that the blood pressure is being maintained at a lower level makes these patients feel better; also many of their subjective symptoms are alleviated, whether from a mechanical or a psychologic standpoint. Objectively, there are favorable changes in the eyegrounds, size of the heart and renal function.

Recently, we have been giving combined tablets of Rauwiloid and Veriloid[2] to most of our patients, even to those with only slight hypertension. We concur with Wilkins (7), and Wilkins and Judson (8) in their observations that administration of Rauwolfia serpentina (a moderately hypotensive agent when given alone), if combined with hydrazinophthalazine or Veratrum viride, is followed by a striking improvement, if not a synergistic effect. In the average case Veratrum viride is preferable to hydrazinophthalazine. In the more stubborn cases, which fail to respond to as many as four tablets daily of the Rauwiloid-Veriloid combination, we add hydrazinophthalazine[3] four times daily.

Small doses of Rauwolfia are often effective following sympathectomy. In 7 sympathectomized patients whose hypertension persisted, one or two tablets of Rauwiloid-Veriloid were sufficient to maintain a satisfactory blood pressure. One man who had a supradiaphragmatic sympathectomy sixteen years ago requires three tablets daily to maintain a pressure of 160/90.

Rauwiloid seemed distinctly beneficial to 4 patients with atrial fibrillation. After two or three weeks of treatment with the drug, it was difficult to distinguish fibrillation upon stethoscopic examination. In all patients the heart rate was definitely retarded, and in most of them rates between 60 and 70 per minute developed.

Although Rauwiloid is a sedative, in a few cases we found the addition of phenobarbital to be advantageous. Three patients had nightmares and could not tolerate the drug. A few complained of nasal congestion. No bladder distress was observed. Occasional gastric uneasiness was experienced when Veriloid was added.

Almost all the patients who were treated with Rauwiloid reported a feeling of well-being and many made such statements as, "This is it!" and "I have not felt so well in years!" In all our experience, no other therapy for hypertension has elicited so many enthusiastic expressions from patients. It is noteworthy that 3 men over 50 years of age, with an average blood pressure of 220/130 did not obtain good results for more than twelve months. After eighteen months of treatment, they had an average blood pressure of 170/90–100, with a concomitant improvement in well-being.

Reserpine[4], apparently one of the most active derivatives of Rauwolfia serpentina, produces all the effects of the latter drug, *i.e.*, hypotension, bradycardia and sedation. Some clinical reports indicate that the dosage of reserpine is critical and the product, therefore, might be more difficult to administer than Rauwiloid. Reserpine also seems to be more of a sedative than Rauwiloid.

[2] The hypotensive ester alkaloids of Veratrum viride, supplied by Riker Laboratories, Inc., Los Angeles, California.

[3] In the form of Apresoline (Ciba).

[4] Riker Laboratories, Inc., Los Angeles, California.

We have used reserpine only in our most resistant cases. One 38-year-old Negress had a blood pressure of 230/160, which failed to subside under four tablets daily of the Rauwiloid-Veriloid combination. One week after the treatment was changed to reserpine (three 0.4-mg. tablets daily) her pressure had dropped to 135/90. While taking the drug, she had severe nocturnal ulcer-like pains. At the beginning of therapy she suffered frequent anginal attacks, but these disappeared during the week. Six other patients with rather high pressures which did not respond to the usual Rauwiloid-Veriloid therapy were given an average of three tablets of reserpine daily. After three to six weeks their pressures averaged 170/90–100. None of the six experienced a critical drop in pressure and none complained of sedation, though they reported a sense of well-being which was undoubtedly an effect of sedation. They also gained weight or had difficulty in avoiding a gain in weight.

We have observed no harmful effects from gradual reduction of the blood pressure. Sudden reduction to a pronounced degree, however, may give rise to serious changes in the cerebral, coronary and renal systems. Some hypotensive drugs act very quickly. Occasionally, when these were given to patients over 50 years of age with long-standing, extremely high blood pressure there was a sudden reduction of the pressure to below 160 systolic, accompanied by a feeling of substernal oppression, which was interpreted as a symptom of coronary artery insufficiency. In a diabetic patient a massive coronary occlusion developed two hours after the injection of 2 cc. of dihydrogenated ergot derivative. On the other hand, a number of patients who had anginal symptoms associated with subendocardial ischemia incident to acute rises in blood pressure, and who had previously taken nitroglycerin at frequent intervals, were almost completely relieved of the need for this drug.

Patients with hypertensive encephalopathy should be hospitalized and every means employed to stabilize the cardiovascular system. In addition to the administration of hypotensive drugs, treatment should include elevation of the head of the bed, digitalization when necessary, a low-sodium diet (unless there is associated persistent azotemia), oxygen therapy if indicated, and other symptomatic measures such as anticonvulsants. Our choice of a hypotensive drug for immediate action has been Veriloid solution given intramuscularly. Results from these measures have been most gratifying. The following is a case in point:

A 71-year-old man first consulted us in January 1950, stating that he had known of his hypertension for at least fourteen years. On physical examination, his pressure was 190/110, and he was found to have an atrial fibrillation and mild congestive failure. The condition responded to digitalis, but after six weeks he discontinued the drug. When next observed, one and a half years later (June 1952), his blood pressure was 230/130. He was again digitalized, given a low-sodium diet, and started on 67.5 mg. of crude Rauwolfia serpentina morning and night. Within one week his pressure had dropped to 194/108 and he felt much better. Thereafter, he was not seen until July 1953. At that time he was taking no medication, his blood pressure was 240/140, and he was troubled with headaches and a mild aphasia.

We were unable to institute treatment until the patient entered the hospital two weeks later. His blood urea nitrogen level was then 22 mg. per 100 cc. and the urine contained 3 plus albumin. Digitalis therapy was resumed and a combination tablet of Rauwiloid (1 mg.) and Veriloid (3 mg.) was given orally morning and night. One week later he complained of a

violent headache and had a generalized convulsion. Intramuscular injections of 0.5 cc. of Veriloid solution were then given at intervals, as often as every six hours when necessary, in order to maintain the systolic pressure as low as 160. By the end of three weeks he required either no injection or not more than one injection in twenty-four hours to maintain his pressure at 140–160/80–90. He was then allowed to return home, with instructions to continue taking the Rauwiloid and Veriloid orally. For the past ten months his pressure has averaged 150/80, his blood urea nitrogen level has been 15 mg. per 100 cc., and there has been no proteinuria.

We consider this an excellent result. Several other patients with hypertensive encephalopathy and 1 with toxemia of pregnancy have been treated by a similar method, also with excellent results.

We have found Veriloid not only potent and safe, but smooth in its effect. It is more readily administered intramuscularly than intravenously, the effect is more easily observed, and frequent blood pressure readings are unnecessary. None of our patients has suffered syncope, even though ambulatory to the extent that toilet privileges were permitted, nor have they reported any effect upon bladder or bowel function.

In our experience, phenobarbital has proved an excellent sedative for patients with hypertension. It is explained to them that the drug modifies their sensitivity (cortical) to unpleasant stimuli arising from their contact with the world. The state of tension is thus reduced and, at the same time, the usual vasoconstrictor effect of the drug upon the arteriolar bed is somewhat neutralized. We have also found Mebaral and Dilantin sodium of value in preventing, not only convulsive states, but convulsive equivalents and focigenic reactions when these are part of the hypertensive picture.

In 1925, Nichols (9) aroused interest in the use of sodium sulfocyanate in the treatment of hypertension. More recently, Thomas (10) reported a study of the mode of action of thiocyanate in essential hypertension and reviewed its effect upon endocrine activity, particularly that of the thyroid and adrenal glands. In selected patients, we have noted good results from treatment with this drug, given in amounts aimed at maintaining the thiocyanate concentration in the blood at approximately 8 mg. per 100 cc. Neither propylthiouracil nor I^{131} have been used for essential hypertension by our group.

Diet. The outstanding studies of Grollman (11) have contributed materially to our understanding of the value of sodium restriction in hypertension. In our experience, low-sodium diets have been most successful in patients with hypertensive disease complicated by congestive failure. These patients have been willing to take the trouble and to endure distaste of the diet in order to obtain the benefits. In the terminal phase of renal failure, salt restriction may aggravate the condition. Daily saline infusions may be helpful in controlling chronic uremia until edema develops; thereafter they should be discontinued.

Patients with uncomplicated hypertension are reluctant to follow a low-sodium diet unless the results are exceptionally gratifying. The rice diet is particularly obnoxious. The protein content in our low-sodium diet is not changed unless the blood urea nitrogen level is as high as 60 mg. per 100 cc. Cationic exchange resins, first suggested by Dock (12), have not been accepted by our patients except as a temporary expedient, and then only in a desperate situation. For

most of our patients the radical restriction of sodium has been unnecessary, especially if one or two tablets of combined Rauwiloid and Veriloid reduce the blood pressure to a satisfactory level. Smithwick (13) has called attention to the fact that patients whose blood pressure is not sufficiently reduced following sympathectomy are highly susceptible to the influence of low-sodium regimens. As stated earlier, we have found that such patients respond well to small amounts of Rauwiloid and Veriloid.

Our observations of the blood cholesterol levels of hundreds of patients indicate a relationship between hypercholesteremia and coronary disease, but not a direct relationship between hypercholesteremia and hypertension. When we have recommended a change of diet for patients with a high concentration of blood cholesterol, the change has consisted chiefly of a reduction in calories, on the theory that "the shorter the belt line, the longer the life line." There has been so much talk about cholesterol in the diet that some individuals are almost afraid to keep an egg in the refrigerator or to have butter and cream on the table. Much fine work is being done in this field and the future may tell us more. For instance, the ultracentrifugal studies by Gofman (14) have stimulated wide interest in atherosclerosis.

Psychic influences. We have been strongly impressed with the work of Wolff (15) at Cornell and of Palmer (16) at the Massachusetts General Hospital, and agree with them that emotional factors materially modify the hypertensive reaction. This being true, the emotiogenic phase of treatment of patients with hypertension may be no less essential then the physical.

Patients with severe hypertension, in particular, seem to be filled with terror over their condition and are highly susceptible to psychic influences. They live in dread of a stroke, a heart attack, or Bright's disease. The thought of the job that was refused or the insurance that was denied because of high blood pressure readings, or even the sight of a blood pressure apparatus, may have a strongly adverse psychic effect upon this group. Not infrequently, their fears are inspired or intensified by a physician who, observing the height of the pressure, gives a shrill whistle and remarks, "Gee, it's going through the roof!", "Boy, are you about to blow a fuse!", or "Something is bound to crack with this blood pressure!" Thoughtless statements of this kind may take root in the minds of patients, leading to an irreversible hypertension and, despite all our reassurance, a lingering fear may continue to haunt them like Banquo's ghost. Many such patients have been treated needlessly and radically over a long period; in these, iatrogenic illness is especially difficult to overcome. We cannot emphasize too strongly the necessity for hope and encouragement by the physician as a routine part of the therapy of the hypertensive patient. The effect of this hopeful approach is exemplified in the case of a woman whom we have observed at intervals for twenty-one years.

When this patient was first seen, at the age of 45, she was having menopausal symptoms and her blood pressure was 160/96. For eighteen years her pressure vacillated between 130/85 and 210/120. At the age of 61 she had two short periods of amnesia, possibly from cerebral thrombosis, the final effects resembling those of a frontal lobotomy. At times, particularly following the amnesia, she became panicky and her blood pressure rose to exceptionally

high levels. Her heart and kidney function remained unaffected. In the beginning she was given hormones, sedatives and, for a short while, psychotherapy; for the past several years she has taken only sedatives at intervals. Throughout she has received a generous amount of encouragement. Her blood pressure has been normal for more than two years and she has felt perfectly well.

Many women and some men undoubtedly have moderate hypertension for several years in middle age, their blood pressures thereafter returning to normal or remaining only slightly elevated. Several of the persons in this group never see a physician. Others are treated successfully by simple measures. For example, nine years ago another of our patients, also a woman aged 45, was found to have a fairly high diastolic pressure. During psychotherapy and administration of hormones, her blood pressure gradually returned to normal and her symptoms subsided. For the past three years she has been entirely free of her former difficulties.

In view of the variability of hypertensive disease, it is not surprising that the question of treatment continues to be a controversial one. Obviously, however, the treatment must meet the requirements of the individual patient and, if necessary, must be carried out over a long period of time. With a well chosen regimen and persistence, one may reasonably expect, in the presence of mild hypertension, not only to prevent serious disturbances but to restore the patient to a normal state. In more advanced disease, the arteriolar process can be sufficiently allayed to enable the patient to lead an unhampered life, or at least to afford relief from distressing symptoms.

SUMMARY

1. Many individuals with slight diastolic hypertension need no treatment other than reassurance.

2. Many with systolic hypertension are needlessly put through a gamut of therapy.

3. Lumbodorsal sympathectomy is seldom necessary. In selected cases, however, it may eliminate the need for medication or restriction of diet or activity.

4. Bilateral adrenalectomy is not to be considered, even for intractable hypertension.

5. Following appropriate surgical procedures for unilateral kidney disease in 2 patients and for pheochromocytoma in 1, previously high blood pressures returned to normal.

6. Many abnormally high blood pressures may be lowered to a desirable level with a combination of Rauwolfia serpentina and a Veratrum viride product; in some instances Rauwolfia serpentina alone is effective. In stubborn cases, hydrazinophthalazine may be added to the Rauwolfia and Veratrum. Other combinations with Rauwolfia are being studied at the present time in various clinics and medical centers in this country, and it is possible that some even more effective and satisfactory drugs will be developed.

7. Patients who suffer from headache are often relieved by controlled thiocyanate therapy, and frequently the blood pressure is concomitantly reduced to a satisfactory degree.

8. A few patients fare well on a low-sodium diet. All those who have even a slight degree of congestive failure should be started on a low-sodium regimen.

9. Only medical therapy is indicated in the presence of persistent, severe renal failure.

10. A blood pressure of 160/100 is a satisfactory level, being sufficiently low to obviate untimely rupture of a vessel in the brain, yet not low enough to interfere with coronary and renal function.

11. It is desirable that patients with hypertension be carefully scrutinized from every standpoint and observed for months, years, or perhaps a lifetime, by a competent physician.

12. In large measure, the success of treatment depends upon the physician's encouragement and assistance in the adjustment of these patients to their environment.

Note: The authors suggest the reading of the papers by Drs. Samuel Proger and Robert Wilkins in *Modern Concepts of Cardiovascular Disease* (October and November, 1953) wherein they express different views regarding the treatment of hypertension. Our opinions, reported here, are similar to those given in Dr. Wilkins' paper, "Current Drug Treatment of Hypertension."

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THE IMPORTANCE OF GLAUCOMA WITH INCREASING AGE*

CONRAD BERENS, M.D.† AND ARNOLD S. BREAKEY, M.D.‡

The Department of Ophthalmology, New York University Post-Graduate Medical School, New York, N. Y.

Glaucoma causes approximately 7 to 15 per cent of all blindness in the United States (1). In this disease there is increased intraocular pressure, which may cause hardness of the eyeball leading to atrophy of the retina, cupping of the optic disk and blindness.

Glaucoma is considered a symptom complex because its etiology may involve 1) capillary permeability, 2) the effect of the autonomic and sympathetic nervous systems on the blood vessels, blood pressure and chemical constituents of the blood, and 3) endocrine disturbances. Thus, glaucoma is a local manifestation of a pathologic process and has been aptly described as a diseased eye in a diseased body.

The possibility of the development of glaucoma with advancing age is evident, for with age the body processes are in a catabolic state. The blood vessels lose their elasticity, blood pressure may rise, the nutritive value of the blood diminishes and the endocrine system, especially in women of menopausal age, functions inefficiently. In a survey of 249 eyes with chronic glaucoma Lloyd (2) noted a sharp rise in the number of cases occurring in the age group from 50 to 54 years, which corresponds somewhat to the menopausal age in women and is a common age for the onset of certain manifestations of cardiovascular and vasomotor instability. In addition, cardiovascular diseases frequently are observed in patients suffering from simple glaucoma (3).

With the advent of penicillin, streptomycin and the sulfonamides, the number of fatalities resulting from bacterial diseases has been dramatically reduced. Modern therapy has contributed to the fact that malnutrition, diabetes, and thyroid diseases no longer take their vast toll of human lives. These advances have caused an increase in life expectancy. Statistics show that there are 11.5 million people, or 7.5 per cent of the total population in the United States today, 64 years of age and older (4). In the past fifty years the number of older people had quadrupled, while the total population has only doubled (5).

Lemoine (6) reported that of 816 glaucoma patients, approximately 85 per cent were over 45 years of age. In a survey of 832 glaucoma patients, Probert (7) noted that the average age at the onset of symptoms was 60 years, and the average age at which the eye became blind was 62 years. He also found that the

* Aided by The Ophthalmological Foundation, Inc., and the Research Department of the New York Association for the Blind.

† Advisory Attending Surgeon and Consultant Director Research-Eye, New York Eye and Ear Infirmary; Professor of Clinical Ophthalmology, New York University Post-Graduate Medical School. Office address: 111 East 59th Street, New York 22, N. Y.

‡ Assistant Ophthalmologist, Lenox Hill Hospital; Associate Ophthalmologist, New York Foundling Home.

average age at the onset of glaucoma in hereditary cases was only four years less than the age at onset for all glaucoma cases. Pichette and Audet (8) examined 111 patients whose average age was 48 years. Of these individuals, 103 were recognized as having preglaucoma or glaucoma. There were 36 preglaucoma patients, with an average age of 30 years, but the average age of the glaucoma patients was 60 years.

As age advances the eye participates in the general sclerosis and loss of elasticity of all the body tissues. Senile changes which may contribute to the development of glaucoma include an increase in thickness with a loss of distensibility of the sclera, and vascular changes. Abnormal growth and swelling of the lens in beginning cataract lessen the size of the anterior chamber, causing a decrease in the filtration angle and a pressing together of the meshes of the ligamentum pectinatum (9). Sclerosis of the ciliary processes and their encroachment on the circumlental space may also be a factor. Moreover, the aqueous humor probably undergoes changes with age.

CLASSIFICATION OF GLAUCOMA

Glaucoma is classified either on an anatomic basis or on a clinical basis. Anatomically, glaucoma is either open-angle or closed-angle, depending upon the depth and width of the anterior-chamber angle.

For the purpose of this discussion, the following clinical classification will be used:

1. Primary glaucoma
   a. Acute uncompensated (congestive or inflammatory)
   b. Chronic uncompensated (congestive or inflammatory), or closed-angle
   c. Compensated (chronic simple or noninflammatory), or open-angle
   d. Absolute
2. Secondary glaucoma
3. Juvenile glaucoma (buphthalmos, congenital glaucoma)

The type of glaucoma occurring in children does not come within the scope of this paper. However, it is attributed to a faulty development of Schlemm's canal, usually involving both eyes. Its existence proves that glaucoma may strike at any age.

PRIMARY GLAUCOMA

The term "uncompensated" in reference to primary glaucoma implies that the eye has not adjusted to the increased tension. In contrast, a diagnosis of compensated primary glaucoma indicates that the eye has accommodated to the increased intraocular pressure and that the vascular reaction is slight.

Acute uncompensated glaucoma usually occurs in individuals 40 years of age or older. Its incidence appears to be higher in women than in men. Constitutionally, it seems to be more prevalent in the thin, energetic type than in the placid individual. Many affected persons are hyperopic.

The major signs and symptoms of acute uncompensated glaucoma are: intense

pain in the affected eye, lacrimation, congestion of the conjunctiva, steamy cornea, shallow anterior chamber, dilated and irregular pupil, reduced vision, increased intraocular pressure and systemic manifestations such as chills and gastrointestinal disturbances. Other general complications associated with this type of glaucoma include: headaches, nausea, vomiting and, at times, a rise in body temperature. Consequently, the condition may be erroneously diagnosed as an attack of indigestion and the increased intraocular pressure may be overlooked.

The onset may be sudden. Usually the media are so cloudy that the retina and optic nerve are obscured from sight. However, if the nerve is visible, no characteristic changes are noted while the disease is in an early stage. The visual fields cannot always be tested accurately.

Certain patients with acute uncompensated glaucoma show an anatomic predisposition to the disease. In these eyes the anterior chamber is abnormally shallow, which leads to reduction in the size of the outlet for the aqueous humor.

Acute glaucoma must be differentiated from iritis, iridocyclitis, conjunctivitis and keratitis. If the onset of the attack is gradual, the congestion is deep, the pupil is contracted and often irregular, the media show turbidity (or opacities) in the pupillary area, the vision is slightly reduced, the pain is fairly severe in the eye and over the first branch of the fifth cranial nerve, the tension is either low or normal (or increased if secondary glaucoma develops), but the constitutional signs are slight, the condition is probably an acute iritis.

If all these signs are present and in addition there are deposits on the posterior surface of the cornea (keratic precipitates), the condition is an acute iridocyclitis.

In conjunctivitis the pupil and the intraocular tension are normal. In keratitis the pupil may be obscured if the cornea is sufficiently clouded, but the tension of the eyeball is usually normal.

When the onset of the attack is sudden, the congestion is deep, the pupil is dilated or oval, the cornea is cloudy, the vision is markedly reduced, pain is severe along the entire fifth cranial nerve (usually along the second branch), tension of the eyeball is increased, and the constitutional signs are severe, characterized by vomiting and prostration, the condition is acute glaucoma.

Chronic uncompensated glaucoma is similar to acute uncompensated glaucoma but is a milder disease. The pain is dull, the cornea less steamy, the pupil dilated and fixed, and the anterior chamber shallow. Intraocular tension is not necessarily increased, but careful examination of the visual fields usually reveals glaucomatous changes.

Chronic glaucoma, to the inexperienced examiner, resembles cataract. Because of such an erroneous diagnosis, a patient with chronic glaucoma may be told to wait until the "cataract" ripens before consulting an eye surgeon.

To distinguish chronic glaucoma from cataract it is necessary to observe the fundus. In cataract neither the fundus nor the fundus reflex can be observed if the opaqueness of the lens is sufficiently advanced to affect sight. In glaucoma the pupil is dilated and fixed. Characteristic of glaucoma are the visual field changes and the increased intraocular tension.

Compensated glaucoma frequently escapes diagnosis because there may be no signs of hyperemia or inflammation and the conjunctiva, cornea and sclera may be normal. According to Braley (10), 1 person in 40 over the age of 40 years has undiagnosed compensated glaucoma.

The clinical picture of compensated glaucoma includes: slow dilatation and rigidity of the pupil, shallow anterior chamber, early lens changes, excavation of the optic disk, diminution in visual acuity, increased and varying intraocular pressure, changes in refraction and in dark adaptation and visual field defects.

As a rule both eyes are involved. The greatest rise in intraocular pressure is usually noted in the early morning. A frequent complaint is seeing colored rings (halos) around distant lights.

In the late stages of the disease the optic disk is whiter than normal, as a result of atrophy of the nerve fibers caused by the increased pressure. The excavation of the nerve head is a typical but late sign. In glaucomatous cupping, the retinal vessels instead of leaving the nerve head and passing the border of the disk uninterruptedly and evenly toward the periphery, suddenly dip from view, bending over the edge of the excavation where they become invisible. Cupping of the optic disk also occurs in optic-nerve atrophy in association with sclerosis of the cerebral arteries. If this condition is confused with glaucomatous cupping, the patient may be subjected to unnecessary surgery.

The changes in the visual fields are usually in the form of a contraction of the nasal half of the field and enlargement of the normal blind spot. The defect in the blind spot is caused by pressure on the nerve fibers as they enter the disk. A blind area (scotoma) extends upward or downward from the blind spot and forms an arcuate scotoma around the point of fixation.

Central vision may remain good until the field changes encroach on the fixation point; however, in rare instances the first changes in the visual fields may be central. Untreated cases progress to complete blindness.

According to Spaeth (11), vascular changes indirectly produce compensated glaucoma through sclerosis of the vessels draining Schlemm's canal and may be the cause of increased eye tension in the retinopathies of such diseases as arteriosclerosis, diabetes or nephritis.

Focal infection has also been advanced as one of the possible etiologic factors in compensated glaucoma. Of 53 unselected cases of compensated glaucoma, all showed varied evidence of sinus infection or nasal pathologic conditions (12). In 70 per cent of these patients the glaucoma was either unilateral or more marked in one eye than in the other, and the nasal involvement was greater on the same side as the eye with the more active glaucoma. These findings are highly suggestive of a close relationship between chronic sinusitis and compensated glaucoma.

The manner in which nasal disease or sinus infection may affect the eye has not been fully determined; however, vasomotor disturbance caused by chronic hyperplastic sinusitis is probably the more important factor. Venous stasis may also play a part by causing congestion of the eye, and bacterial allergy must be given some consideration.

Of the 53 unselected patients with compensated glaucoma, the age in 7 was not accurately known; 2 were between 20 and 30 years of age, 5 between 31 and 40 years, 10 between 41 and 50 years, 13 between 51 and 60 years, 15 between 61 and 70 years, and 1 patient was over 70 years of age. Thus more than half of the patients were between 40 and 70 years of age.

Absolute glaucoma is the end-result of all glaucoma which is untreated or is unresponsive to treatment. The excessive pressure causes atrophy, degeneration of the retina, and blindness. Other complications may include: severe pain, serious clouding of the cornea, bullous keratitis, dilatation and engorgement of the scleral vessels, and cataract. The fundus is no longer visible. When vision is lost enucleation may be advisable.

SECONDARY GLAUCOMA

Secondary glaucoma may be defined as that form of increased intraocular pressure which is associated with some known cause (13). Clinically it may resemble acute or chronic uncompensated glaucoma. It may result from iritis, cyclitis, keratitis, congenital anomalies of the eye, a contusion of the eyeball that produces an intraocular hemorrhage in the anterior chamber, vitreous, retina or choroid, tears in the iris, or the retina at the ora serrata, and rupture of the choroid. Glaucoma may also result from surgical procedures such as iridectomy or discission of the lens, and from wounds, *e.g.*, a corneal wound in which the iris has become incarcerated, forming anterior synechiae or a staphyloma. Intraocular hemorrhage following intraocular operations, particularly expulsive (subchoroidal) hemorrhage from one of the posterior ciliary arteries, may cause secondary glaucoma.

When secondary glaucoma occurs in acute iridocyclitis it is characterized by a deep anterior chamber, and by keratic precipitates. The increased tension is usually associated with a cloudy cornea and blurred vision.

Chronic uveitis may present the picture of acute glaucoma with a history of seeing halos around lights and transient obscuration of vision followed by an acute attack which resembles acute primary glaucoma. Chronic uveitis may also resemble chronic glaucoma in cases with increased ocular tension associated with keratic precipitates.

Glaucoma may follow intraocular inflammations as a result of mechanical obstruction either at the angle of the anterior chamber or at the margin of the pupil, and especially in cases of occlusion and seclusion of the pupil in which iris bombé has developed.

Essential atrophy of the iris may produce secondary glaucoma, due to obliteration of the anterior chamber and alterations in the crystalline lens, such as subluxation or dislocation, senile exfoliation of the capsule, swelling or intumescence, hypermature morgagnian cataract, and microphakia.

The occurrence of cataract with glaucoma in one eye has a grave prognosis. Complications may be expected, since most of these patients are in the seventh decade (14).

The most frequent form of hypertension due to disease of the retina results

from thrombosis of the central retinal vein. In approximately 70 per cent of all patients with complete thrombosis of the central vein, secondary glaucoma develops within from three to six months (15). However, if only one branch of the central vein is involved, secondary glaucoma is not likely to occur.

When detachment of the retina has been present for some time and when hemorrhages, exudates or iridocyclitis have occurred, secondary glaucoma may ensue. A tumor should be excluded in these cases.

Intraocular tumors which directly or indirectly obstruct the angle of the anterior chamber, the ciliary body, or the vortex veins, may be the etiologic factor in secondary glaucoma. The most common among these tumors is malignant melanoma; its highest incidence is in the fifth and sixth decades (16).

Gradle (15) recommended regular observation of the intraocular pressure in patients suffering from angiomas of the orbit, pulsating exophthalmos, orbital tumors and similar conditions.

Whenever intense stasis of the orbital veins is present, secondary glaucoma may be a complication. Paresis of the sympathetic vasomotor control of the eye is thought to be a factor.

THE MECHANISM OF GLAUCOMA

The maintenance of normal intraocular pressure depends largely upon a balance between the intake and outflow of fluids from the eyeball. Under normal conditions the contents of the eyeball press outward with a force approximating the weight of a column of mercury 18 mm. in height. Thus, the shape of the eyeball and the proper relationships of the refracting media are maintained. The tissues of the eyeball are nourished by the continuous formation of aqueous fluid. The circulation of this fluid is not in the form of a true current but is thought to be maintained by the pressure of the pulse beat and muscular contraction (17). Either an increase in the inflow or a decrease in the outflow raises intraocular tension. Obstruction of the efferent channels is considered the more prevalent condition. This may result from obstructive disease of the veins and sclerosis of the fibers of the pectinate ligament, causing a narrowing of the drainage spaces at the angle of the anterior chamber, enlargement of the crystalline lens, and adhesion of the root of the iris to the cornea.

Another factor closely associated with intraocular pressure is the elasticity of the ocular coats (18). The cornea and sclera of the adult eye do not readily distend. Therefore, even a small increase in the volume of the ocular contents gives rise to a marked increase in intraocular pressure. Because the sclera becomes more inelastic with advancing years, small increases in volume content may have a serious effect on intraocular tension in older age groups. When glaucoma develops in adult life, the rigidity of the coats of the eye prevents adjustment to the disease.

A third factor in the regulation of intraocular pressure is variation in the size of the choroidal vessels and the vessels of the ciliary body. These arteries, arterioles and capillaries are under the vasomotor control of the sympathetic nerves (15).

When arterial pressure is increased in the carotid artery, the sympathetic nerves carry impulses to the eye so that the vascular system of the eyeball adjusts to the increased pressure and the choroidal vessels contract, thus averting a marked increase in volume. Otherwise, every increase in arterial pressure would increase the fluid content of the eyeball and result in hypertension (15).

In Elwyn's opinion (19) primary glaucoma is due to an inherited defect in the central mechanism which maintains intraocular pressure at a normal level. According to this theory, at about middle age central regulation may become unstable, so that impulses from the center reach the effector organ in an irregular manner. As a result, the production of acetylcholine at the nerve endings in the effector organ is spasmodic. Tension therefore fluctuates. In the later stages of primary glaucoma, organic changes occur in the angle of the anterior chamber.

Gradle (15) proposed the following theory to account for a beginning attack of acute uncompensated glaucoma: In an eye with an anatomic predisposition, namely a shallow anterior chamber, there occurs a sudden temporary derangement of the pressure regulatory apparatus. At the same time arterial pressure temporarily increases. The pulse pressure wave enters the relaxed choroidal vessels. This is followed by an actual increase in the volume content of the eyeball, which puts the vitreous under increased pressure, resulting in forward displacement of the lens and iris. Because the angle of the anterior chamber is shallow, the slight forward motion of the iris blocks the angle and the outlet of the aqueous fluid. This fluid, however, continues to form behind the iris, thus further blocking the angle of the chamber and setting up the clinical picture of acute uncompensated glaucoma.

DETECTION AND EXAMINATION OF GLAUCOMA

In patients over 30 years of age tonometric readings made directly before and after the instillation of a mydriatic or cycloplegic are informative. The results of several readings should be compared. In this way it may be possible to diagnose incipient glaucoma or preglaucomatous conditions months or years before they would otherwise have been detected. However, in the aged, after the use of a mydriatic, tension increases in direct proportion to age. Therefore it is important to avoid reducing the filtration angle in the eyes of these patients.

Gradle (20) estimated that the average intraocular pressure readings in 1,000 eyes of patients over 30 years of age was 19.63, using the Gradle-Schiötz tonometer. The curve of intraocular pressure according to age is fairly uniform, but is lowest between the third and fourth decades, highest in the sixth to seventh decade, and decreases after the seventh decade (20).

Ocular tension may be studied by means of palpation, tonometry, or the ocular hypertension indicator.

When palpation is performed the patient is directed to look downward. The examiner presses gently on the eyeball with the index fingers of both hands through the upper eyelid, above and beyond the tarsus, so that the tarsus does not intervene between the palpating fingers and the eyeball. Pressure is exerted

against the eyeball with one finger, while the eye is steadied with the other. The hardness of the eyeball is estimated by the sense of fluctuation, transmitted to the stationary finger.

A more reliable method of measuring tension is by means of the tonometer. Tonometry is used to measure, to detect and to exclude increased or decreased intraocular pressure and to follow the progress of a case of glaucoma. The technic (21) is as follows:

The cornea is anesthetized by instilling two or three drops of a solution of Pontocaine (0.5 per cent) or Holocaine (1 per cent) at one-minute intervals into the conjunctival sac. The tonometer is tested on the testing plate to ascertain that it is functioning smoothly and accurately. If it is, it will register zero.

The base plate of the tonometer is wiped with alcohol and then dried with cotton. The patient is placed in a comfortable reclining position, care being taken to avoid any constriction of his neck. He then fixes his gaze on a spot on the ceiling or a small object held above his eye in such a position that the cornea is in the horizontal plane. The eyelids are separated gently with the thumb and index finger of the left hand. The tonometer is held between the thumb and index finger of the right hand and placed vertically so that its base plate and the plunger in its center rest on the apex of the cornea. The examiner slides the sleeve of the tonometer down gently toward the base plate so that no pressure is exerted on the cornea by the handle of the instrument.

The Schiötz tonometer is provided with three weights, namely, 5.5, 7.5 and 10.0 grams. The most accurate measurements are obtained if the examiner selects the weight which produces a minimum impression, *i. e.*, a reading between 2 and 5 mm. on the scale. If the reading obtained with one weight is checked with the reading obtained with the next weight, the two readings should not differ by more than 2 or 3 mm. of mercury.

If the eyball is soft, there is little resistance to the plunger and the weight it carries. If the eyeball is hard there is more resistance. The upper end of the plunger is in contact with an arm connected with the indicator, which moves along a scale. The reading is obtained either directly from the instrument (McLean or Bailliart tonometer) or is converted into millimeters of mercury by comparing the reading on the scale of the tonometer (Schiötz) with the accompanying chart.

The tension is recorded for each eye separately, indicating the type of instrument and the weight employed: T. O. D.—25 mm. Hg, Schiötz (7.5 Gm.); T. O. S.—20 mm. Hg, Schiötz (5.5 Gm.).

The normal variations of intraocular pressure are between 16 and 25 mm. of mercury with the Schiötz tonometer and between 22 and 40 mm. with the McLean tonometer. Tension above 25 mm. (Schiötz) or above 42 mm. (McLean) is suggestive, and above 28 mm. (Schiötz) and 45 mm. (McLean) is pathologic.

The scleral tonometer (Bailliart) is not as accurate as the corneal tonometer but its use does not require the instillation of an anesthetic. This is an advantage when measuring the tension of patients who are nervous or whose corneas are misshapen or abnormal. After the scleral foot plate is inserted in the tonometer it is placed temporally on the sclera about 5 mm. from the limbus. Pressure is directed toward the center of the eyeball. When the collar on the instrument is depressed to the groove underlying it, the reading is made.

The examiner should be aware of the fact that tension is increased by excitement, the use of coffee, cola beverages, or tea and by the excessive intake of fluids. It is lowered by miotics, massage or repeated applications of the tonometer. The time of day is also an important variable. Tension is often higher in the morning and lowest in the evening. Normally the difference between the morn-

ing and the evening reading should not vary more than 3.0 mm. of mercury (Schiötz). If the difference is greater than 3.0 mm., glaucoma should be suspected. In a glaucomatous eye the difference may be as much as 15 or 20 mm. In many cases it is only by studying the day and night fluctuation in tension for several days that glaucoma can be detected.

When glaucoma is suspected but the diagnosis is difficult to make, provocative tests may be advisable. There are a number of them but the darkroom test will be used as an example. Normally tension rises only about 2 mm. of mercury after staying in a darkroom for forty to sixty minutes. If an increase of 6 mm. occurs, glaucoma should be suspected. This test is recommended for patients with closed-angle glaucoma. For patients with open-angle glaucoma Braley (10) advises the tension curve or tonography (*i.e.*, the use of a recording electronic tonometer).

A survey of 10,500 workers over 40 years of age made by the Philadelphia Committee for the Prevention of Blindness revealed 2.7 per cent (more than 280 persons) with undiagnosed ocular hypertension (22). On the basis of this figure it has been estimated that 1 million adult Americans have glaucoma and do not know it. These figures were reaffirmed by a recent study in Cleveland, Ohio (23), in which 240 known cases (and 300 suspects) were found among 12,063 people—slightly less than 2 per cent.

In order to reach these unsuspecting victims of glaucoma, tests for ocular hypertension (24) should be included in mass health surveys and there must be closer cooperation between general practitioners, industrial physicians, public health agencies and ophthalmologists (25). Lemoine (6) reported that in his series two thirds of the glaucomatous eyes were not congested and that his most important finding was the need for greater emphasis on the early diagnosis of glaucoma.

The general practitioner may be aware of the possibility of glaucoma and be thoroughly familiar with the symptoms and signs of the disease, but many of these manifestations are not detectable in the early stages. Moreover, tonometers are delicate and expensive instruments, which require frequent calibration to ensure their reliability.

In order to screen patients in the glaucoma age-group and facilitate the detection of increased intraocular tension, a simple, rugged and inexpensive hypertension indicator has been devised (26) as follows:

> The complete instrument with protective caps is 7.0 cm. long and 1.8 cm. in diameter and weighs less than 35 grams. The foot-plate assembly is a hollow tube with the standard Schiötz foot plate at the bottom. One component of the indicating device is rigidly mounted on the top end. In it is a hole to accommodate the plunger assembly. The reference line is engraved on a flat surface which intersects the central hole, and is interrupted at the edges of the vertical slot which exposes the plunger index. A transparent plastic lens is cemented to the flat surface. This lens has a 45-degree reflecting surface, so that the instrument can be read from the top. The top surface is a cylindrical magnifying lens of approximately 2.5 power. Two closely spaced index lines are used on the plunger to be read against the (interrupted) single reference line on the foot-plate member.

With this ocular hypertension indicator,[1] measurements are obtained within suitable limits of accuracy, whether the tension falls within a "bracket" of tensions above normal, or whether the degree of hypertension constitutes an emergency.

PROGNOSIS IN GLAUCOMA

In glaucoma the prognosis is generally based on the tonometric readings taken from time to time and on a comparative study of the fields of vision.

Untreated glaucoma usually progresses to blindness. Therefore, since treatment does not cure the disease but merely arrests it, the earlier a diagnosis is made the better are the probabilities for retaining useful vision. Once vision is lost, it can never be regained.

Acute uncompensated glaucoma, if properly treated immediately, has a better prognosis than the chronic form. But when an attack of acute glaucoma has lasted for forty-eight hours the prognosis is not hopeful. Secondary glaucoma associated with retinal hemorrhages (hemorrhagic glaucoma) has a particularly poor prognosis.

Moreover, many cases of glaucoma resist all forms of treatment. Another point is that, even though treatment does lower intraocular tension to within the normal range, vision may be reduced through the continuing atrophy of the optic nerve.

TREATMENT OF GLAUCOMA

Treatment includes general and local measures. General treatment is directed toward the elimination of any general disease, the removal of foci of infection and the avoidance of emotional disturbances, worry, anxiety, stimulants and fatigue.

Local treatment may be medical or surgical. The main principle of medical treatment is to apply solutions of miotic drugs which are strong enough to keep the pupil contracted. Such drugs are pilocarpine and eserine. Pilocarpine, although the preparation of choice for the treatment of chronic glaucoma, is a mild drug and it is not always as effective as some others. A 1 or 2 per cent solution of pilocarpine is usually prescribed three or four times daily, or a solution of eserine containing from 0.016 to 0.65 Gm. (½ to 1 grain) to the fluid ounce (30 cc.).

If the patient exhibits an idiosyncrasy to pilocarpine or to eserine, manifested by tearing, conjunctivitis, blepharitis and itching, the use of other drugs is advisable. These include 3 per cent Prostigmine, 10 per cent Mecholyl, 0.75 per cent Doryl and 0.05 per cent DFP (diisopropylfluorophosphate).

The local application of epinephrine is sometimes recommended, on the basis of the theory that there is an initial vasodilation followed by a vasoconstriction, which exerts a beneficial effect on the tension of the eye. A 1 per cent solution of epinephrine hydrochloride may be instilled locally. Epinephrine packs, consisting of cotton pledgets soaked in epinephrine (1:1,000), placed

[1] The general physician can obtain this instrument if his ophthalmologist will write to The Ophthalmological Foundation, Inc., 111 East 59th Street, New York 22, N. Y., and will *state* his willingness to teach the physician how to use the instrument.

in the upper or lower cul-de-sac have been effective in reducing intraocular pressure. A 1:50 epinephrine solution or a 2 per cent solution of *l*-Glaucosan has been used locally.

Additional therapy includes Dionin, hot applications, and digital massage of the eyeball. The treatment outlined is efficacious in compensated glaucoma but is not generally effective in acute uncompensated glaucoma.

Elwyn (19) believes that if primary glaucoma is still in the strictly functional stage it responds to drugs which have the muscarinic action of acetylcholine and which inhibit cholinesterase, thus preventing the destruction of acetylcholine. Only after organic changes have developed in the angle, the trabeculae or in the vessels is surgical intervention required.

In acute uncompensated glaucoma the following treatment outline is suggested: 1) eserine (0.5 to 1 per cent)—one drop instilled in the affected eye every ten minutes for from one to two hours; 2) Mecholyl and Prostigmine in combination; 3) Diamox, 250 mg. twice daily; 4) retrobulbar injection of procaine (1.5 cc. of 2 per cent solution); 5) morphine sulfate in proper doses to control pain; 6) ice bag to the eye; 7) catharsis (*e.g.*, magnesium sulfate); and 8) intravenous infusion of 25 cc. of a 50 per cent glucose solution, as an aid in lowering pressure. If the pressure returns to normal the prognosis for controlling the tension is good. However, if the increased tension persists, surgery is indicated.

In chronic uncompensated glaucoma, operation may not be immediately necessary if the patient responds to medical treatment, *i.e.*, tension is controlled and contraction of the visual fields is not progressive. It is important to observe the unaffected eye carefully, even though the glaucoma is apparently unilateral. As the glaucoma becomes more chronic, the response to miotics decreases. When surgery becomes necessary a filtering operation, *e.g.*, trephine or iridocorneosclerectomy (27), is usually the procedure of choice, although in the early stages of narrow-angle glaucoma an iridectomy may suffice.

In the treatment of secondary glaucoma, elimination of the cause should be considered. As already stated, glaucoma may be secondary to various types of pathologic conditions of the eye, *e.g.*, uveitis, a swollen lens (traumatic cataract), or adhesion of the iris to the cornea or lens capsule. A special operation, such as removal of the lens, may be required in secondary glaucoma.

Hemorrhagic glaucoma usually necessitates the removal of the eye. This is also true in glaucoma due to an intraocular tumor.

Experience has shown that if tension and contraction of the visual fields cannot be controlled by the simpler miotics, operation is indicated and should be performed without delay. At times the fear of surgery by elderly patients is so great that they accept loss of vision rather than undergo an operation that might permit them to retain useful vision. Before deciding to operate on patients in the older age group who have glaucoma which is unresponsive to medical treatment, they should have a careful physical examination, with appropriate laboratory studies, and they should understand that there will be a tedious convalescent period. After the age of 65 conservative therapy should be stressed (6).

The essential criteria for surgical intervention are the degrees of change in visual acuity, tension of the eye and visual fields. A progressively narrowing visual field, even with normal tension (conditions other than glaucoma having been excluded), is a definite indication for operation. An eye with normal tension and even normal visual acuity but with a markedly contracted field is severely handicapped functionally.

The primary purpose of the surgical treatment of glaucoma is the provision of improved drainage of the intraocular fluids. Operation is usually imperative in acute glaucoma and should be advised in chronic glaucoma if the patient has a life expectancy of ten to fifteen years. Operation is also advocated when the patient is careless in persevering with medical treatment, or when medical treatment is ineffective in controlling tension.

Simple iridectomy is considered the most effective operation in acute uncompensated glaucoma, but is of limited value in chronic glaucoma. In treating chronic glaucoma, iridectomy is combined with excision of a small piece of sclera, either by means of scissors or a punch (Lagrange) or the trephine (Elliot). Trephining is favored by certain surgeons because it is not difficult to perform, the results are usually successful and the eye is not disfigured. Essential steps in trephining are: a wide-angled conjunctival flap; splitting and not cutting the cornea; a 2-mm. trephine opening, half in the cornea and half in the sclera; a narrow iridectomy, leaving the trephine opening free from the iris; and a continuous suture for closing the conjunctival wound (17). Iridocorneosclerectomy (27) and iridencleisis also offer a good prognosis in chronic glaucoma.

Other methods include iris inclusion operations in which a portion of the iris is drawn into the wound and left there. In cyclodialysis, the ciliary body is separated from the sclera by introducing a spatula through a scleral wound.

Another operation for glaucoma is goniotomy (28), which is performed with the aid of a gonioscope. By this means, the angle of the anterior chamber can be incised under direct observation.

In treating absolute glaucoma the injection of a 70 per cent solution of alcohol into the ciliary ganglion is sometimes successful in relieving pain and stabilizing tension. Opticociliary neurotomy is valuable, according to Arruga (29). However, cycloelectrolysis is recommended in preference to cyclodiathermy for the control of tension, because the reaction is less and the results are possibly better (13).

When surgical intervention is necessary in the treatment of secondary glaucoma, the choice of operation is greatly dependent upon the cause. Although a filtering operation is indicated for inactive iridocyclitis, certain conditions require reduction in aqueous secretion for effective control of ocular hypertension, *e.g.*, hemorrhagic glaucoma, active chronic uveitis, and conditions for which filtering operations have failed or usually fail, as in Negroes.

Iridocorneosclerectomy (27) with complete iridectomy is frequently successful in lowering tension, when an immature cataract is present and the lens is not swollen. After a cataract has been extracted, cyclodialysis has been efficacious in controlling tension if the base pressure is not too high (lower than 40 mm. of mercury (Schiötz)). Cycloelectrolysis is also performed in glaucoma, following

cataract extraction; it is preferred to cyclodiathermy because postoperative reaction is less and atrophy of the eyeball is rare. In a statistical review of 816 patients with 1,112 glaucomatous eyes, Lemoine (6) found that patients with aphakic glaucoma were for the most part in the older age group; 87 per cent were over 50 years of age.

If glaucoma and cataract are present in one eye, conservative measures may necessitate two operations. Birge (14) warns that some of these patients, because they are usually elderly, succumb to heart disease, cerebral vascular accidents and other terminal illnesses during the long operative and convalescent periods.

Cyclodiathermy and cycloelectrolysis have also been used in secondary glaucoma following thrombosis of the central retinal vein.

GENERAL CONSIDERATIONS OF GLAUCOMA IN OLDER AGE GROUPS

Although glaucoma may develop at an early age, statistics reveal that a marked increase in the number of cases is noted in the older age groups. This poses a problem for all physicians, in view of the increase in the proportion of older people in the population. Normal intraocular pressure depends largely upon a balance between the intake and outflow of fluids from the eyeball. The lack of elasticity of ocular tissues with advancing age prevents the eye from adjusting to even small increases in volume content.

Age is an important factor in acute uncompensated glaucoma, for its incidence is higher in individuals who are over 40. The difficulty lies in differentiating this disease from iritis, conjunctivitis, iridocyclitis and keratitis. The chronic form is similar to the acute, but is a milder condition. It must be differentiated from cataract and secondary glaucoma.

The relationship of age to compensated glaucoma is suggested by the fact that Braley (10) has estimated that 1 person in 40 over the age of 40 has undiagnosed compensated glaucoma. The reason that this type of glaucoma escapes diagnosis is that the eye adjusts pathologically but painlessly to the increased tension, and the external vascular signs are minimal. The patient may complain of seeing halos around distant lights.

However, the end-result of all undiagnosed glaucoma, or diagnosed glaucoma that does not respond to treatment, is blindness and absolute glaucoma.

Because, with age, the tissues of the eye lose their elasticity and are more subject to pathologic changes, secondary glaucoma is a frequent complication. Its treatment is dependent upon the cause, which may be as difficult to diagnose and treat as the glaucoma itself.

The instillation of a mydriatic into the eyes of the aged may cause an increased intraocular tension which is proportional to the patient's age. However, in younger patients, if measurements of tension are taken before and after such an instillation and there is fluctuation, incipient glaucoma may be detected. Thus, with age, the filtration angle of the eye should seldom be reduced by mydriatics or cycloplegics and care should be exercised in the systemic administration of atropine and drugs which have a similar action.

The methods used to detect glaucoma include palpation and tonometry. Tonometry is the more reliable method but requires experience, and tonometers need frequent calibration. The ophthalmologist performs tonometry in his examination but the general practitioner should be provided with a simpler screening technic. Therefore, an ocular hypertension indicator has been devised (26). With this instrument the physician can determine within suitable limits of accuracy whether intraocular tension falls within a normal range. This ability is important when we note that more than 280 persons in a survey of 10,500 workers who were over 40 years of age had undiagnosed ocular hypertension.

Mass health surveys should include a test for ocular hypertension, because untreated glaucoma progresses to blindness. Even the prognosis of diagnosed glaucoma is not always hopeful, for certain glaucomatous eyes resist all therapeutic measures.

Treatment is directed toward the improvement of the patient's general health, the reduction of tension by means of miotics that contract the pupil, relief of pain, proper eye hygiene, and the avoidance of anxiety situations.

If tension and contraction of the visual fields cannot be controlled by these means, surgical intervention is advisable.

The importance of glaucoma as a cause of blindness is revealed by the fact that from 7 to 15 per cent of all blindness in the United States is due to this devastating process. With the increase in the number of older people in our population this figure may rise. Therefore, every effort should be made to detect glaucoma early, so that the incidence of preventable blindness from this dread disease will not increase. Examination for glaucoma should be made a part of every annual physical check-up and all industrial and insurance examinations.

SUMMARY

Statistics show that 11.5 million people in the United States today are 64 years of age and older. Since glaucoma attacks particularly those of advanced age, it is of utmost importance to be alert to its early diagnosis. Moreover, it is estimated that 1 million adult Americans have undiagnosed glaucoma.

Primary glaucoma is classified into four groups. In acute uncompensated glaucoma there may be sudden onset, intense pain, inflammation, and systemic disturbances. This disease must be differentiated from iritis, iridocyclitis, conjunctivitis and keratitis. Chronic uncompensated glaucoma is a milder disease and may be confused with cataract. Compensated glaucoma may escape diagnosis because of the absence of inflammation and the gradual adjustment of the eye to the increased intraocular pressure.

Another type is secondary glaucoma, which resembles acute or chronic uncompensated glaucoma. Its etiology is varied, and includes inflammations of the eye, injury, tumors, cataract, and thrombosis of the central retinal vein. Absolute glaucoma is the end-result of all untreated glaucoma, or of glaucoma which does not respond to treatment. As a rule, all vision is lost and enucleation may be necessary. Diagnosis, prognosis, therapy and screening methods are

discussed. An ocular hypertension indicator suitable for use by physicians is described.

Awareness by the physician of the possibility of glaucoma, familiarity with its signs and symptoms, and the ability to rule out its presence, will permit many elderly people to end their days with useful vision instead of becoming victims of the final stage of the disease, which is blindness. To obviate this, every physician should make the determination of intraocular tension a routine part of his physical examination.

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ORAL METRAZOL IN THE PSYCHOSES ASSOCIATED WITH OLD AGE

LEO HOLLISTER, M.D.* AND WALTER F. FITZPATRICK, JR., M.D.

Veterans Administration Hospital, Palo Alto, California

Psychoses associated with old age have increased as the population has aged. It would be a significant advance if a therapeutic procedure could ameliorate these psychoses, either to the extent of preventing the need for institutional care of such patients, or in making such care easier.

Metrazol® (pentamethylenetetrazol) has long been known as a cerebral stimulant and as an analeptic agent. In recent years an oral preparation has been made available which is being given extensive clinical trials in patients with psychoses of old age. Generally favorable results have been reported by a number of authors (1–6). Good results have been described as improved behavior (lessened anxiety, agitation, confusion and emotional lability), improved appetite, lessened fatigability and improved sleep. Dosages used in such studies have varied between 0.4–1.2 grams daily given for one month to three months. In most of the studies reporting favorable results no controls were used. In two studies in which controls or blind methods of testing were used, no changes attributable to the drug were noted (7–8). In another study in which placebos were used, no changes were noted when Metrazol, nicotinic acid, or cytochrome C were given separately or together, but improvement was obtained with a mixture of Metrazol and nicotinic acid in compound pepsin elixir (9). All previous studies agree that side effects are few (nausea and vomiting only occasionally) and that no significant changes were noted in the results of various laboratory determinations, including electroencephalographic tracings. Blood pressure was not found to be significantly elevated in hypertensive patients receiving the drug.

METHODS

The 40 patients selected for study were hospitalized. All but 1 were men. The age range was 58 to 94 years, with a median age of 67 years. Psychiatric diagnoses were distributed as noted in Table 1.

On the basis of chance selection, patients received either Metrazol or placebo tablets. No personnel other than the pharmacist knew which patients received active medication until the study was completed and the evaluation of the results had been made. Two tablets (0.2 Gm.) were given four times daily for sixty days. Clinical appraisal of the patients' mental and physical status was made before and immediately after the study. In addition, the Hospital Adjustment Scale (10) was used for evaluation of behavioral changes. Electroencephalograms were obtained during the last month of the trial on 18 patients selected at random. Blood pressure records and indicated laboratory determinations were

* Clinical Instructor in Medicine, Stanford University School of Medicine, and Chief, Medical Service, Veterans Administration Hospital, Palo Alto, California.

TABLE 1

Results with Oral Metrazol® in 40 Patients with Psychoses Associated with Old Age (Double Blind-Study Control)

Psychiatric Diagnosis	Number of Patients	Number Receiving Metrazol	Number Improved	Number Improved who Received Metrazol
CBS*, cerebral arteriosclerosis	21	12	4	1
CBS, senile brain disease	6	2	2	2
Involutional psychotic reaction	4	2	1	0
CBS, uncertain cause (presenile)	2	1	1	1
Schizophrenic reactions	3	2	2	1
CBS, brain traumata, gross force	2	1	0	0
CBS, alcoholic intoxication (Korsakoff)	1	0	0	0
CBS, CNS syphilis	1	0	0	0
	40	20	10	5

* Chronic brain syndrome.

made at intervals during the trial. Four patients who were originally nominated for the trial had to be replaced because of failure to accept the medication. No patient died during the study. One patient was subjected to operation for incarcerated inguinal hernia in the final week of treatment.

RESULTS

Ten patients were judged to show some improvement during the period of study. The improvement was of slight degree in all and related only to behavioral changes. In none of the improved patients was there enough change to alter the need for hospital care.

Of the 10 patients who improved, 5 had received Metrazol and 5 had received placebos. Thus it is obvious that whatever improvement was seen was due to chance variations in the clinical course of these patients' psychosis. Furthermore, despite the fact that 15 patients receiving Metrazol had disorders most likely to be benefited (cerebral arteriosclerosis and senile or presenile brain disease) only 3 patients in these categories improved. Fourteen patients with similar diagnoses were in the placebo-treated group and 4 of these patients had improved.

No toxic reactions were noted. Blood pressures were not significantly changed during treatment. Laboratory findings were unchanged. Two patients in the series had a previous history of seizures. Neither patient happened to receive active medication, but both had their normal number of seizures under placebo therapy. Electroencephalograms showed minor abnormalities in 7 of the 18 patients tested. Generally these abnormalities were of the type that would be expected in this age group and in patients with brain disease. The number of abnormal tracings was divided almost equally between the Metrazol-treated and the placebo-treated group.

DISCUSSION

Oral Metrazol had no appreciable effect on the clinical course of psychoses of old age in a group of 20 patients who received the drug. The dosage of the drug used and the length of treatment were comparable to these factors in other reported series. The findings confirm observations made earlier at this hospital by Gonda and Worthington (11), who treated 7 senile psychotic patients for prolonged periods with oral Metrazol and failed to demonstrate any benefit.

Several considerations may explain the failure of this drug to have the expected results. First, these patients had a high degree of disability. Only 9 of them had better than average scores on the Hospital Adjustment Scale. Although 7 of these 9 patients had received Metrazol, only 2 had shown improvement. Second, the clinical diagnosis of chronic brain syndrome due to cerebral arteriosclerosis is often in error. In a neuropathologic study of 505 cases of psychoses associated with old age, cerebral arteriosclerosis was found to be a factor in only 43.9 per cent (12). It was the sole factor in only 24.4 per cent. Such inaccuracy of diagnosis may alter the observed effectiveness of a drug, the beneficial action of which is largely due to an increase in cerebral blood flow or a reduction in cerebral hypoxia. Third, damage to the central nervous system tissue is considered to be irreversible. The most that any drug might be expected to do would be to preserve the remaining undamaged tissue from future damage or to enhance its function. There is no evidence as yet to suggest that any drug can do either of these things consistently, or that, if such effects were obtained, there would be lessening of the original disability.

SUMMARY

A study of the effect of oral Metrazol in 40 patients with psychoses associated with old age was performed, using a double-blind control. Improvement of slight degree was noted in only 10 of the 40 patients. Five of the 10 improved patients received placebos, indicating that improvement was due to chance variation in the clinical course of the psychoses rather than the medication. No harmful effects of the drug were noted. It is concluded that oral Metrazol is without value in the treatment of patients hospitalized for psychoses of old age.

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Abstracts of Current Literature

ATHEROSCLEROSIS.

Blodgett, W. A. *J. Kentucky State M. A.* **52:** 497 (July) 1954.

This discussion cites the evidence that implicates the blood lipids in the genesis of atherosclerosis. Attention is presently centered on four aspects of lipid metabolism in relation to atherosclerosis—cholesterol itself, the cholesterol-phospholipid (C-P) ratio, the alpha and beta lipoproteins, and the S_f lipoproteins. Recently reported studies of clinical atherosclerosis have combined observations of all four types to form so-called plasma lipid patterns. These show that the lipid patterns in newborn infants resemble those in immune mammals. Sometime during childhood, normal adult values are attained for total blood cholesterol, C-P ratio, cholesterol contained in alpha and beta lipoproteins, and S_f12–20 lipoproteins. Elderly individuals show abnormal patterns—elevation in total cholesterol not accompanied by a rise in phospholipid, an increased percentage of cholesterol in the beta lipoproteins, and an increase in S_f12–20 lipoproteins. The lipid patterns of premenopausal women have been found most closely to resemble those of infants and immune mammals and this correlates well with their relative freedom from coronary heart disease. The obvious difference between premenopausal women and other adults in the presence of circulating estrogen suggested a possible therapeutic application. In men who had survived myocardial infarctions, estrogen altered abnormal lipid patterns. The percentage of cholesterol in alpha lipoprotein increased, but that in beta lipoprotein decreased. The C-P ratios fell and in most cases the level of total cholesterol in the plasma also fell. All returned to previous levels when estrogen was discontinued. The manipulation of lipid patterns achieved in these studies represents a significant advance in understanding the genesis of atherosclerosis. Other studies in progress should yield more rational therapeutic measures.

FLUID AND ELECTROLYTE EXCHANGE IN PATIENTS WITH BURNS.

Bull, J. P., and England, N. W. J. *Lancet* **2:** 9 (July 3) 1954.

A study was made of the intake and urinary output of fluid, sodium, chloride, and potassium in treated burned patients. Sodium and water retention usually occurred in the first few days following a burn. Their excretion could be increased by raising the intake, but this may be an undesirable procedure. No anuria occurred in the 33 patients studied. The character of the urine did not suggest a tubular lesion. A moderate temporary azotemia developed in severely burned patients. Moderate negative potassium balances found in the first few days could be corrected by moderate increases of intake. Patients with treated burns showed no extreme variations of serum electrolyte levels, but a moderate fall of the serum sodium level was usual during the period of retention. Patients aged more than 55 years showed a greater tendency than younger ones to retain water, the mean duration of water retention being two days longer. The retention of sodium was concomitantly increased but not to the same extent. The duration of renal retention of sodium was prolonged and in 2 of 5 elderly patients with moderate intake the urinary excretion of sodium was suppressed. The fluid and electrolyte responses of an aged person to a burn appear to resemble those of a younger person to a severe burn.

THE ASSOCIATION OF CORONARY OCCLUSION AND INFARCTION WITH DIABETES MELLITUS. A NECROPSY STUDY.

Feldman, M., and Feldman, M., Jr. *Am. J. M. Sc.* **228:** 53 (July) 1954.

In 1,319 consecutive adult necropsies, 137 cases of diabetes mellitus were found, an incidence of 10.4 per cent. Among these, there were 60 cases associated with coronary oc-

clusion and infarction, an incidence of 43.8 per cent. The incidence of associated coronary heart disease and diabetes (43.8 per cent), was compared with the 20.1 per cent incidence of coronary occlusion and infarction noted in a study of the necropsy findings in nondiabetic adults. This indicated that coronary occlusion is twice as prevalent in the diabetic as in the nondiabetic. Previous observers are generally agreed that the degree of cardiovascular change is greater in diabetic than in nondiabetic patients, and that its onset is at an earlier age. In this series the sex ratio was the same in diabetics with coronary occlusion as in the diabetics without coronary occlusion. In both groups there was a decided preponderance of females (60 and 61 per cent respectively). This is in contrast to the predominance of males among patients with coronary disease but without diabetes.

CALCINOSIS COMPLICATING PEPTIC ULCER THERAPY.

Foltz, E. E. *Gastroenterology* **27:** 50 (July) 1954.

The case is presented of a peptic-ulcer patient with the syndrome produced by excessive ingestion of milk and absorbable alkali. The findings included hypercalcemia, azotemia, elevated blood chloride level, normal serum alkaline phosphatase, protein and CO_2 levels, presence of red and white blood cells in the urine, and corneal changes consistent with those found in calcinosis. Renal embarrassment had been present for nineteen months or more. Points of similarity between this patient and patients with this syndrome previously described included the metastatic calcification, the presence of blood cells in the urine, and the absence of acidosis and hypoproteinemia due to renal insufficiency. In addition, striking electrocardiographic changes are described. When the ingestion of milk and absorbable alkali was stopped the azotemia disappeared, and the serum calcium level and the electrocardiogram returned to normal. This patient had ingested large quantities of calcium carbonate, but that alone did not appear to have produced the syndrome. An excessive milk intake and renal failure both were thought to be contributing factors. The electrocardiographic changes might be accounted for by the hypercalcemia.

VASCULAR LESIONS IN DIABETES MELLITUS. III. PATHOGENESIS.

Goodman, J. I. *A.M.A. Arch. Ophth.* **52:** 108 (July) 1954.

Diabetic retinopathy is a separate, discrete, readily recognized entity unrelated to atherosclerosis. Diabetic retinopathy and Kimmelstiel-Wilson disease are closely related anatomically and physiologically. In diabetics, the control of the diabetes is an important factor governing the development of retinopathy and intercapillary glomerulosclerosis. Diabetic retinopathy is reversible. The retinal and glomerular lesions can be produced experimentally in rabbits with alloxan-induced diabetes by the administration of cortisone and corticotropin. Diabetic patients showing Kimmelstiel-Wilson lesions in the kidneys also show in a high percentage of the cases lipid vacuoles in the zona fasciculata of the adrenal glands. Most likely retinopathy is a consequence of a metabolic disorder characterized by a hormonal imbalance. The concept of adrenal hyperactivity to explain the occurrences of retinopathy and intercapillary glomerulosclerosis in diabetics, though inviting, is still hypothetical and awaits confirmation.

TREATMENT OF ESSENTIAL HYPERTENSION WITH THE HYDROGENATED ALKALOIDS OF ERGOT. FURTHER OBSERVATIONS.

Grenfell, R. F. *Am. Pract. & Digest Treat.* **5:** 532 (July) 1954.

Reported are the results of further study of hydrogenated alkaloids of ergot in the treatment of essential hypertension in 57 patients over a two-year period. The pre-treatment blood pressure readings represent the result of repeated observations. A substantial decrease

occurred in every patient. The maximum decrease in the systolic blood pressure was 90 mm. Hg and in the diastolic, 40 mm. Hg. The average decrease in the former was 42.5 and in the latter 19.6 mm. Hg. A sustained drop in blood pressure usually occurred two weeks after Hydergine was begun, 1 cc. being administered three times weekly. Two months were required in 1 patient to obtain a sustained level. The dosage schedule was important. When, instead of a gradual decline in their frequency, too great an interval elapsed between injections, the maximum blood pressure drop was not obtained. Hydergine had to be administered more frequently during periods of stress, followed by a gradual return to the maintenance schedule. No serious side effects or toxic reactions occurred. Five patients had mild nasal stuffiness, 2 had transitory mild weakness, and 1 had a slight decrease in visual acuity. Death in 3 patients was thought not to be related to the administration of Hydergine, and cerebral thrombosis and coronary thrombosis were considered not to have resulted from its administration. No drop in systolic blood pressure below 120 mm. Hg was observed, nor any symptoms of hypotension. No changes occurred in the electrocardiogram, blood chemical constituents, or phenolsulphonphthalein excretion. No tolerance to the drug developed.

ELECTRORETINOGRAM IN CIRCULATORY DISTURBANCES OF THE RETINA.

Henkes, H. E. *A.M.A. Arch. Ophth.* **52:** 30 (July) 1954.

Electroretinography was applied in 108 patients showing vascular retinal and choroidal involvement. Four groups were investigated: 1) hypertensive retinopathy without arteriosclerosis—11 patients, aged 31 to 50 years; 2) hypertensive retinopathy with arteriosclerosis —50 patients, aged 50 to 70 years; 3) diffuse retinal atherosclerosis without hypertension—28 patients, aged 50 to 70 years; and 4) diffuse choroidal atherosclerosis with or without hypertension—19 patients, aged 50 to 70 years. In patients of Group 1, showing minor signs of vascular involvement, the predominantly supernormal electroretinogram (ERG) recordings were considered to be the result of deficient nutrition of the retinal neurones due to constriction of the retinal vessels. In 1 patient, bilateral sympathectomy resulted in a return of the electrical response to normal. A subnormal response in malignant hypertensive retinopathy was attributed to a greatly altered metabolic condition of the retina. Between Group 2 and Group 3, showing the same minor retinal alterations, a definite difference in electrical response was apparent when the recordings were continued beyond the usual five-minute period of rest and dark adaptation. Subnormal responses were fewer in cases showing arterial hypertension than in those without hypertension. Hypertension, therefore, would appear to be a mechanism by which the organism can compensate for otherwise insufficient nutrition of the retina. The frequency of subnormal ERG's was highest in Group 4. The discrepancy between the electroretinographic findings and the ophthalmoscopic picture suggested a more extended pathologic process than could be revealed by the ophthalmoscope.

GIANT-CELL (TEMPORAL) ARTERITIS.

Heptinstall, R. H.; Porter, K. A., and Barkley, H. *J. Path. & Bact.* **67:** 507 (Apr.) 1954.

Fourteen cases of giant-cell arteritis, all proven histologically, are described. With the exception of 1 man aged 48, all were over the age of 62; there were 10 males and 4 females. Visual disturbances occurred in 8 cases and pain in limbs and joints in 5. Autopsy was performed in 3 cases, the cause of death being amyloidosis in 1 and cerebral softening in the other 2. In the autopsy cases vascular changes were widespread, affecting the aorta, branches of the carotids and large limb arteries. All showed a distinctive histologic picture, with giant-cell reaction and disruption of the internal elastic lamina, the giant cells being arranged in relation to damaged elastic tissue. In some cases giant cells were scanty; they

probably decrease in number as the lesions age. The patient who died from amyloidosis showed arthritic changes also. Although the histologic picture is in many respects similar to that of polyarteritis nodosa, there are sufficient points of difference to warrant a separation in our present state of knowledge.

CHRONIC RENAL INSUFFICIENCY. PART I. APPRAISAL OF THE PATIENT. PART II. TREATMENT.

Hopper, J., Jr.; Bolomey, A., and Wennesland, R. *Ann. Int. Med.* **41:** 18 (July) 1954.

In this review an analogy is drawn between acute renal insufficiency and chronic renal insufficiency, and the suggestion made that the lesion in the latter, as in the former, may sometimes prove reversible. Pertinent points in the appraisal of the patient with chronic renal insufficiency are reviewed. Emphasis is laid upon the fact that modern concepts of treatment require more precise diagnosis, not only in the nosologic realm but also from the point of view of physiologic and biochemical changes. The aim is to extend life as long as possible by a therapeutic regimen which maintains physiologic balance. In some cases the time gained may allow healing to occur. In the majority of cases life can be prolonged, with the patient maintaining normal activities until the time comes when all therapy fails. (Authors' summary.)

PROSTATIC CANCER. XI. EARLY PROSTATIC CANCER DIAGNOSED BY ARBITRARY OPEN PERINEAL BIOPSY AMONG 300 UNSELECTED PATIENTS.

Hudson, P. B.; Finkle, A. L.; Hopkins, J. A.; Sproul, E. E., and Stout, A. P. *Cancer* **7:** 690 (July) 1954.

The absence of significant symptoms and the inadequacy of physical examination in detecting prostatic carcinoma prompted a study of 300 unselected males subjected to open surgical biopsy of the posterior prostate. None had sought medical care or advice for prostatic or other disease. Frozen-section diagnosis proved practical in the clinical management of these patients. Thirty-nine adenocarcinomas were detected. Only 9 yielded findings on rectal palpation suggestive of carcinoma. It is recommended that definitive surgery be preceded by an adequate open surgical biopsy of the posterior prostate through a perineal incision. Among the reasons for this recommendation are the inadequacies of rectal palpation and punch biopsy for discovery of the disease and the inadvisability of expressing prostatic fluid. Hardness of the prostate is often a late rather than an early feature of prostatic carcinoma. Diagnostic errors on the basis of rectal palpation are about equally divided between false-negative and false-positive impressions. Only 2 of 21 prostatic carcinomas in the group studied were detected by punch biopsy. Expression of prostatic fluid for use in diagnosis is unwise, because prostatic cancer spreads by means of the perineural spaces and cells may be disseminated by massage or manipulation. Tissue diagnosis is imperative when the preoperative impression is benign prostatic enlargement. The finding of unsuspected cancer in conservative prostatectomy specimens is an indication for total prostatectomy. Attention is called to the fact that there is no nonlethal form of prostatic cancer, or at least no criteria have as yet been devised to differentiate it from a lethal form. An increase in prostatic cancer parallels the increase in the life span of males. Benign prostatic hypertrophy often coexists with prostatic cancer. Early surgical relief of all obstructing prostatic growths is warranted. Delay for the purpose of watching a small hard prostatic nodule is unwise, as such nodules almost always indicate a tumor of proportions larger than suspected. The authors remind that hormonal control with estrogen is applicable to metastatic carcinoma of the prostate and is not a substitute for early detection and excision.

NEW METHODS OF SURGICAL TREATMENT OF DEGENERATIVE DISEASES OF THE ABDOMINAL AORTA.

Julian, O. C.; Grove, W. J.; Dye, W. S.; Javid, H., and Sadove, M. S. *Ann. Int. Med.* **41:** 36 (July) 1954.

Studies of the natural history of abdominal aneurysm indicate that life expectancy after diagnosis is less than that of the general population of the same age. Apparently no statistical studies have been made of life expectancy after diagnosis of Leriche's syndrome. A review of previous methods of treatment of these disorders indicates that better methods are required. From the results in 14 patients in whom the lower segment of the abdominal aortic bifurcation and a portion of the iliac vessels were resected and replaced by preserved homologous grafts, this procedure is concluded to be safe and practical. The operative technic is described. General endotracheal anesthesia is employed. Great benefits are derived from the use of hypotensive anesthesia. Resection of an abdominal aneurysm is indicated if it is causing symptoms or is increasing rapidly in size. The longest known follow-up is just over three years, so that the eventual fate of homologous grafts of the bifurcation is unknown. Among 7 patients with Leriche's syndrome in whom resection was performed, 12 had good or excellent results, 1 was unimproved, and 1 died of a cardiovascular accident one week postoperatively. Pulses were restored bilaterally in 10 patients, and unilaterally in 4. No death or deterioration of results occurred in the follow-up period. Abdominal aortography is performed when a Leriche syndrome is suspected but is of little assistance in evaluation of aneurysms; it is not employed postoperatively. Heparin was not used in the patients reported but regional heparinization of the lower extremities during the time that blood flow is interrupted may be advisable.

FACTORS CONCERNED IN THE PALLIATION OF MAMMARY CARCINOMA.

Lemon, H. M. *Bull. New England M. Center* **16:** 71 (June) 1954.

A number of factors pertinent to the palliative therapy of metastatic mammary carcinoma have been briefly reviewed, including pathology of the tumor, its biologic response to estrogens, the role of the ovary and adrenal cortex in secretion of estrogens before and after the menopause, and the relation of increased serum and tissue acid phosphatase activity to the spread of mammary carcinoma. Considerable sex-steroid metabolism has been demonstrated *in vitro*, using surviving mammary-carcinoma specimens. In addition to sex-hormone administration, oophorectomy and adrenalectomy, cortisone therapy appears to benefit objectively inoperable cases, especially in late postmenopausal females. Provided that dosage is adequate and sufficiently prolonged to inhibit adrenocortical estrogen production, beneficial results can be anticipated in patients with a) absent ovarian function, b) hormone dependent tumors. (Author's summary).

CARCINOMA OF THE PINNA.

Metcalf, P. B. *New England J. Med.* **251:** 91 (July 15) 1954.

Skin cancer of the pinna is principally a disease of elderly men who have had considerable exposure to sun and weather. Surgery is the treatment of choice for the local lesion, local recurrences, or suspected regional metastases. Lesions involving the concha and anterior base of the pinna warrant especial care in evaluation and treatment. The reported rates of three-year and five-year cures in this disease seem unnecessarily low.

TOLERANCE OF THE AGED FOR MAJOR SURGERY.

Oberhelman, H. A. *Postgrad. Med.* **16:** 22 (July) 1954.

No hard and fast rules can be formulated for evaluating the surgical risk in a geriatric patient. Age 70 was considered the minimum "old" age for a series of 163 patients under-

going surgical procedures. Major operations were required in 158 patients, illustrating that aged patients procrastinate until conditions become serious, and they are likely to be poor surgical risks. The conditions most commonly encountered in these 163 patients, in order of their frequency, were malignant growths (particularly of the gastrointestinal tract), biliary-tract disease with complications such as empyema and jaundice from common bile duct obstruction, intestinal obstruction due to nonmalignant diseases, and peptic ulcer complicated by hemorrhage, perforation, penetration or obstruction. The over-all mortality rate was 7.3 per cent. Among the 139 major abdominal operations, it was 8.6 per cent. The 12 patients who died had an average age of 78 years. The cause of death usually was cardiovascular disease or infection. These results indicate that elderly people who can get about and take care of themselves have adequate reserves to carry them through a major operation. Each should have blood chemical determinations and evaluation of the cardiovascular status. Some require emergency procedures but operation can frequently be delayed, unless there is a traumatic condition or exsanguinating hemorrhage, while the patient is fortified against surgical trauma or shock. The important points regarding surgery in the aged are an adequate blood supply, restoration of the electrolyte balance, the use of a Levin tube for Wangensteen suction during abdominal operations, cautious preoperative medication with half the normal doses, avoidance of radical procedures by performing operations in stages, careful administration of fluids, and careful watch over the patient postoperatively. Expert management of the anesthesia is required. In the postoperative period, overhydration should be avoided, gastric suction continued, and early ambulation accomplished.

PAINLESS MYOCARDIAL INFARCTION: A REVIEW OF THE LITERATURE AND ANALYSIS OF 220 CASES.

Roseman, M. D. *Ann. Int. Med.* **41:** 1 (July) 1954.

The literature on myocardial infarction without pain is briefly reviewed. A re-examination of the data indicates a low incidence in contrast to earlier studies. Factors such as the definition of pain and the detail with which pathologic studies are made may account for the variability in the reported statistics. Among 220 patients with an unequivocal diagnosis of myocardial infarction, most of whom were in the age range of 51 to 70 years, there were 10 cases of myocardial infarction without pain. Excluding 5 who had an inadequate history, a clouded sensorium, or no history at all, the incidence in this group of patients was 2.3 per cent. In addition, 15 patients complained of discomfort rather than pain. It is concluded that painless myocardial infarction does occur. The most common symptom is dyspnea. Among the possible mechanisms to explain the absence of pain are 1) so-called "covered symptoms," 2) the relative insensitivity of the subject to pain, particularly when the infarction occurs slowly, and 3) anesthetization of an area through the destruction of vessels, nerves, and functioning muscles as a result of progressive narrowing of coronary arteries.

PREMEDICATION IN THE AGED.

Rumble, L., Jr. *South. M. J.* **47:** 651 (July) 1954.

Preoperative medication is planned for psychic sedation, for the reduction of metabolic activity, secretions in the pulmonary passages, reflex activity, and for the prevention of spasm in the laryngo-tracheobronchial tree. Each must be accomplished without endangering oxygenation. In the elderly, arteriosclerosis-induced suboxygenation in all tissues, and decreased efficiency of excretory organs may tend to cause unusual susceptibility to these drugs. For sedation, the dosage of morphine should not exceed ⅛ grain. Demerol is preferred in patients over 70 years of age, as it is less likely to cause respiratory depression.

The dosage should be from 75 to 25 mg., adjusted downward with increasing age. Among barbiturates, sodium phenobarbital is preferred, in a dosage of 2 to 4 grains. It has the advantage of being excreted by the kidneys, and its depressant action is slight, whereas many of the short-acting barbiturates in doses of ¾ to 1½ grains possess an undesirable depressant effect over a long period. For the reduction of secretions in the pulmonary passages, belladonna derivatives are the most effective, atropine being preferred. It is given in a ratio of 25:1 with morphine.

Ample time must be allowed for the effects of premedication before the additional depression of anesthesia is added. When general anesthesia is used, the opiate and belladonna drugs are given one and a quarter hours before operation. The barbiturate is given two hours preoperatively, and is usually used only for operations performed late in the day. A barbiturate is used with regional anesthesia and given one and a half to two hours preoperatively. The hypodermic is then given one hour before operation. Procaine amide in patients with premature ventricular contractions may help in avoiding ventricular tachycardia. Aminophyllin prior to induction aids in the prevention of bronchospasm in emphysematous and asthmatic patients. Auricular fibrillation of short duration may be corrected by digitalis. When there is passive pulmonary congestion, diuresis and a salt-free regimen are indicated. Extreme caution is advised in attempting rectal anesthesia in the aged, there being few indications for it.

HEMOCHROMATOSIS: CLINICAL FEATURES AND METHODS OF DIAGNOSIS IN 27 CASES.

Stauffer, M. H.; Butt, H. R., and Dockerty, M. B. *Gastroenterology* **27:** 31 (July) 1954.

A study has been made of 27 cases of hemochromatosis encountered at the Mayo Clinic during a period of five and one-half years. The disease was classified as primary in 25 cases and as secondary in 2. It predominated in men. The majority of the patients were aged 42 to 68 years. Needle biopsy of the liver appears to be the earliest, as well as the most reliable method for diagnosis. In 7 cases, negative results of cutaneous biopsy were noted although results of hepatic biopsy were positive, demonstrating the value of obtaining hepatic tissue for histologic examination. Jaundice was usually absent and the excretion of sulfobromophthalein was often normal despite the presence of well-demonstrated pigmentary cirrhosis. Hemochromatosis should be considered in any patient who has unexplained hepatomegaly. Diabetes mellitus was absent in 12 of the 27 cases, illustrating that this complication need not be present to establish the diagnosis of primary hemochromatosis. Diabetes is more frequently seen when the disease is advanced. Of this group of 25 patients who had primary hemochromatosis, 5 (20 per cent) were eventually found to have hepatomas. The term "secondary hemochromatosis" is suggested for those cases in which refractory, aplastic or hemolytic anemia is present and in which the number of transfusions appears inadequate to account for the disease on an exogenous basis. The term "exogenous hemochromatosis" is suggested when definite cirrhosis develops after 100 or more transfusions have been administered. It is suggested that the term "hemosiderosis" still be used for those cases in which severe anemia of any type has required many transfusions, leading to excessive deposition of iron, but in which cirrhosis is absent. (Authors' summary and conclusions.)

ALLERGIC PROSTATITIS IN ASTHMATICS.

Stewart, M. J.; Wray, S., and Hall, M. *J. Path. & Bact.* **67:** 423 (Apr.) 1954.

In 2 patients, both asthmatic subjects, prostatectomy and prostatic biopsy respectively disclosed a striking and unusual prostatic lesion consisting of focal granulomata with central fibrinoid necrosis of the type commonly associated with various allergic diseases

(such as polyarteritis nodosa or rheumatic carditis). In one case there was focal and diffuse eosinophil-cell infiltration of great intensity. Three similar cases have been found recorded in two recent American publications. Inasmuch as one of the authors' cases showed eosinophilic pus in considerable amount within many of the prostatic glands, it is suggested that in asthmatics with prostatic symptoms, and indeed in all asthmatics, the urine should be examined microscopically for eosinophil cells both before and after prostatic massage.

THE HYPOMETABOLIC STATE: A CLINICAL ENTITY.

Watson, B. A. *New York State J. Med.* **54:** 2045 (July 15) 1954.

Among 14,998 patients admitted to a general medical service during six years, 201 cases of the hypometabolic state were diagnosed, an incidence of 1.3 per cent. The average duration of two and a half years from onset of symptoms to diagnosis indicates that this disease is being overlooked. It is prevalent in the fourth, fifth, and sixth decades of life. The patients in this series ranged in age from 17 to 79 years. Thirty-eight per cent of the males and 32 per cent of the females were over the age of 50 years. Morning fatigue, with alertness before retiring at night, was the most common symptom of the disease and was reported by 83 per cent of the patients. Other associated symptoms were cold intolerance, brittle nails, dry skin and, in female patients, menstrual disorders. The basal metabolism was usually at the lower limits of normal in the hypometabolic state but may not be diagnostic. A therapeutic trial with desiccated thyroid may be initiated for one month when the diagnosis has been established. The dosage of thyroid in this series varied from 2 to 8 grains daily, depending primarily upon the severity of symptoms and secondarily on the basal metabolic rate. Results in 151 patients were noted over periods of two months to four years. Marked improvement, with disappearance of symptoms, occurred in 117 patients and no improvement in 12. Twenty patients used as controls improved and felt well but their symptoms recurred within a month when thyroid was discontinued. Hypochromic anemia, resistant to iron and liver, occurred in 5 patients and was corrected by the use of thyroid. Hypometabolism may coexist with other diseases. It is being recognized as a frequent contributory factor to the production of psychoneurotic and anxiety states.

OBSERVATIONS ON THE METABOLIC TRANSFORMATION AND EFFECTS OF PHENYLBUTAZONE IN SUBJECTS WITH HEPATIC DISEASE.

Weiner, M.; Chenkin, T., and Burns, J. J. *Am. J. M. Sc.* **228:** 36 (July) 1954.

No significant differences were found between the rates of disappearance of phenylbutazone from plasma of normal subjects and those with advanced Laennec's cirrhosis following a single oral dose of 800 mg. Preliminary *in vitro* experiments, using tissue slices and homogenates, indicated that the liver is probably the major site of metabolism of phenylbutazone. In 9 cirrhotic patients maintained on phenylbutazone therapy for one to five months, there was no evidence of further impairment of liver function.

CHANGES IN THE BLOOD CHEMISTRY OF PATIENTS WITH DISSEMINATED CARCINOMA OF THE BREAST DURING ENDOCRINE THERAPY.

Woodward, H. Q.; Escher, G. C., and Farrow, J. H. *Cancer* **7:** 744 (July) 1954.

Data are presented which showed changes taking place in the protein, calcium, inorganic phosphorus, and alkaline phosphatase levels in the serum of 231 patients with inoperable mammary cancer during treatment with sex hormones or after surgical castration. Similar data for 63 patients with prostatic cancer are included for comparison. There was a marked fall in the concentration of serum protein in patients with breast cancer during treatment with standard estrogens and a smaller fall during treatment with standard androgens. This decrease in protein concentration is presumed to be due to retention of water. No consistent

changes were observed in the serum protein level of castrated patients, and there were only small changes in patients treated with androstanolone. Endocrine therapy was not associated with significant changes in the concentration of serum calcium in patients without metastases to bone, provided corrections were made for variations in protein-bound calcium. In patients with metastases to bone, exacerbation of the disease was frequently accompanied by a rise in the serum calcium level, and remission by a fall. In patients without metastases to bone, treatment with estrogens caused a marked fall in the value for serum inorganic phosphorus that was too great to be accounted for by water retention. There was some indication that androgens also caused a decrease in the serum phosphorus value and that castration caused an increase. In patients with metastases to bone, changes in the concentration of serum phosphorus were seen that appeared to be related both to the hormonal agent used and to the clinical response. The types of endocrine therapy employed did not cause conspicuous changes in the serum alkaline phosphatase level of patients without metastases to bone. In patients with metastases to bone there was frequently a rise in the concentration of serum alkaline phosphatase that began about three weeks after the institution or the discontinuation of endocrine therapy, persisted for three to four months, and then subsided. Such a temporary rise in the level of serum alkaline phosphatase is here termed a "flare." The occurrence of a phosphatase flare is not closely associated with the type of endocrine therapy employed, the sex of the patient, or the character of the clinical response. It appears to reflect an increase of regenerative activity in bone that takes place during periods of endocrine imbalance.

AMERICAN GERIATRICS SOCIETY

THE 1955 ANNUAL MEETING

The 12th Annual Meeting of the American Geriatrics Society will be held at the *Hotel Roosevelt* in *New York City* on *April 21 and 22, 1955.*

The Hotel Roosevelt in New York has set aside a number of rooms to take care of Fellows who plan to attend the meeting. Write to Mr. A. G. Schellenberg, Reservation Manager, Hotel Roosevelt, Madison Avenue at 45th Street, New York 17, N. Y. Mention that you will attend the annual meeting and Mr. Schellenberg will be glad to take care of your needs.

The Scientific Sessions will be held in the Palm Terrace Room.

The Annual Business Meeting will be held in the Palm Terrace Room immediately following the close of the afternoon session on Thursday, April 21.

The Annual Dinner is scheduled for the Palm Terrace Room on Friday evening, April 22, at 8 o'clock preceded by cocktails in the foyer of the Palm Terrace Room at 7 o'clock.

Local Arrangements Committee: Thomas H. McGavack, M.D. (Flower and Fifth Avenue Hospitals, New York), Chairman; Edward B. Allen, M.D.; Harry A. Coveler, M.D.; C. Ward Crampton, M.D.; Cortez Enloe, M.D.; Cornelius P. Rhoads, M.D.; Harry Seneca, M.D.

Norris J. Heckel, M.D.
President

SCIENTIFIC PROGRAM

HOTEL ROOSEVELT

MORNING SESSION—THURSDAY, APRIL 21

Norris J. Heckel, M.D., presiding

8:00 Registration

9:00 Dermatologic Problems in the Aged
Morris Leider, M.D., New York, N. Y.

9:15 Problems Peculiar to Surgery in the Aged—An Analysis of Over 300 Surgical Operations
Arkell M. Vaughn, M.D. and Michael S. White, M.D., Chicago, Illinois

9:30 Diagnosis and Therapy of Migraine
Harold W. Lovell, M.D., New York, N. Y.

9:45 Results of Treatment of Fractures of the Neck of the Femur in the Aged
M. S. Goldstein, M.D., C. L. Beye, M.D., M. Bonfiglio, M.D. and S. E. Ziffren, M.D., Iowa City, Iowa

10:00–10:20 Question Period
10:20–10:30 Recess for Refreshments

Edward Henderson, M.D., presiding

10:30 MANAGEMENT OF BLADDER DYSFUNCTIONS IN THE PARAPLEGIC PATIENT
John Kingsley Lattimer, M.D., New York, N. Y.

10:45 RECENT DEVELOPMENTS IN THE THERAPY OF CHRONIC RESPIRATORY DISEASES
Carl Muschenheim, M.D., New York, N. Y.

Question Period—*Malford W. Thewlis, M.D.*, presiding

11:00–12:45 **PANEL ON DIABETES IN THE AGED**

Moderator:
Laurance W. Kinsell, M.D., Oakland, California
Collaborators:
Howard Root, M.D., Boston, Mass.
Thomas H. McGavack, M.D., New York, N. Y.
Irving Graef, M.D., New York, N. Y.
Herbert Pollack, M.D., New York, N. Y.
Beverly C. Smith, M.D., New York, N. Y.
Edward Tolstoi, M.D., New York, N. Y.
Foster Murphy, M.D., Philadelphia, Pa.

12:45 LUNCHEON

AFTERNOON SESSION—THURSDAY, APRIL 21

Richard J. Kraemer, M.D., presiding

1:45 CAUSES AND MANAGEMENT OF POSTMENOPAUSAL UTERINE BLEEDING
J. Donald Woodruff, M.D., Baltimore, Maryland

2:00 PELVIC FINDINGS IN WOMEN AFTER 65
Dean Farley, M.D., and John R. Wolff, M.D., Chicago, Illinois

2:15 CORRELATION OF X-RAY DIFFRACTION AND METAL CONTENT OF AGING AORTA
Hans H. Zinsser, M.D., Los Angeles, California

2:30 TUBE FEEDING IN ELDERLY PATIENTS
James Barron, M.D. and L. S. Fallis, M.D., Detroit, Michigan

2:45 MANAGEMENT OF ANESTHESIA IN THE OLDER AGE GROUP
John E. Osborn, M.D., Rochester, Minnesota

3:00–3:20 Question Period
3:20–3:30 Recess for Refreshments

Edward B. Allen, M.D., presiding

3:30–5:30 **PANEL ON CARDIAC AND CIRCULATORY DISEASES**

Moderator:
C. T. Stone, M.D., Galveston, Texas
Collaborators:
George Griffith, M.D., Los Angeles, California
Hugh Montgomery, M.D., Philadelphia, Pa.
Oglesby Paul, M.D., Chicago, Ill.
Gerald H. Pratt, M.D., New York, N. Y.
Charles Fox, Jr., New York, N.Y.

5:30 **Business Meeting**—Limited to members only.

MORNING SESSION—FRIDAY, APRIL 22

Hollis E. Clow, M.D., presiding

8:00 REGISTRATION
9:00 DIAGNOSIS AND TREATMENT OF CHRONIC GLAUCOMA
William F. Hughes, Jr., M.D., Chicago, Illinois

9:15 THE DILEMMA OF GASTRIC ULCER—BENIGN OR MALIGNANT? A PLAN OF MANAGEMENT FOR GERIATRIC PATIENTS
Brock E. Brush, M.D. and Robert J. Priest, M.D., Detroit, Michigan

9:30 TREATMENT OF INTESTINAL OBSTRUCTION IN THE AGED
Frank Glenn, M.D. and George Wantz, M.D., New York, N. Y.

9:45 CONCERNING THE DIAGNOSIS AND TREATMENT OF SUBDURAL HEMORRHAGE IN THE AGED
Matthew T. Moore, M.D., Philadelphia, Pa.

10:00–10:20 Question Period

10:20–10:30 Recess for Refreshments

Thomas H. McGavack, M.D., presiding

10:30 JAUNDICE IN THE AGED: DIAGNOSTIC AND THERAPEUTIC IMPLICATIONS
Frederick Steigmann, M.D. and V. Godellas, M.D., Chicago, Illinois

10:45 URINARY 17-KETOSTEROID EXCRETION AS INFLUENCED BY AGE AND DISEASE
Thomas H. McGavack and Sidney Pearson, New York, N. Y.

11:00–12:45 **PANEL ON OSTEOPOROSIS**

Moderator:
Ephraim Shorr, M.D., New York, N. Y.

Collaborators:
Daniel Laszlo, M.D., New York, N. Y.
Nathan W. Shock, Ph.D., Baltimore, Md.
G. Donald Whedon, M.D., Bethesda, Md.
Harry L. Jaffe, M.D., New York, N. Y.

12:45–1:45 LUNCHEON

AFTERNOON SESSION—FRIDAY, APRIL 22

Harold G. Wolff, M.D., presiding

1:45 DIAGNOSIS AND TREATMENT OF PAIN IN THE ACROMIO-CLAVICULAR JOINT
Charles V. Heck, M.D. and Fremont A. Chandler, M.D., Chicago, Illinois*

2:00 THE PREFERENCE FOR STREPTODUOCIN IN THE TREATMENT OF TUBERCULOSIS OF THE AGING
Harry Shubin, M.D., Philadelphia, Pa.

2:15 ROENTGEN THERAPY IN CHRONIC CHEST SYMPTOMS IN THE ELDERLY
Anthony F. Rossitto, M.D., Wichita, Kansas

2:30 THE TREATMENT PARKINSON'S DISEASE IN THE AGED
Robert S. Schwab, M.D., Boston, Mass.

Laurance W. Kinsell, M.D., presiding

2:45–4:45 **PANEL ON CANCER**

Moderator:
C. P. Rhoads, M.D., New York, N. Y.

Collaborators:

HORMONAL THERAPY IN CANCER
Rulon W. Rawson, M.D., New York, N. Y.

EVALUATION OF ADRENALECTOMY FOR CANCER OF THE PROSTATE AND BREAST
H. T. Randall, M.D., New York, N. Y.

PALLIATIVE THERAPY OF CANCER OF THE LUNG
D. A. Karnofsky, M.D., New York, N. Y.

THE INDICATIONS FOR THE USE OF ISOTOPES IN MALIGNANT DISEASES
J. E. Rall, M.D., New York, N. Y.

* Deceased, December 24, 1954.

PAPERS READ BY TITLE

TURNING BACK THE CLOCK
Simeon C. Allen, M.D., Boston, Mass.

CONGENITAL HEART DISEASE IN THE AGED
Louis F. Bishop, M.D., New York, N. Y.

ADVANTAGES OF AMBULATORY PROCTOLOGY TECHNIQUES IN THE ELDERLY PATIENT
Alfred J. Cantor, M.D., Long Island, N. Y.

ARTERIOSCLEROSIS AND MODERN LIVING
Aris Carpousis, M.D., Washington, D. C.

CARCINOMA OF THE BREAST IN THE AGED
T. C. Case, M.D., New York, N. Y.

EARLY DIAGNOSIS OF CHRONIC DISEASE. USE OF EMISSION SPECTROSCOPE IN DETERMINATION OF TRACE ELEMENTS IN HUMAN BLOOD
Henry Eisfelder, M.D., Roslyn Heights, N. Y.

THE USE OF DIGITALIS IN THE GERIATRIC PATIENT
Samuel Epstein, M.D., Brooklyn, N. Y.

A GERIATRIC CLINIC IN A GENERAL HOSPITAL—FIRST YEAR'S EXPERIENCE
Louis Friedfeld, M.D., New York, N. Y.

NEWER ASPECTS AND TECHNIQUES IN GERIATRIC PSYCHIATRY
Hal W. Geyer, M.D., Milford, Delaware

ATTITUDE THERAPY FOR NON-INSTITUTIONALIZED ELDERLY PSYCHOTICS
Ralph Ginzberg, M.D., Tomah, Wisconsin

SERUM BETA-LIPOPROTEIN IN THE AGED: METABOLIC CORRELATION
Leo Gitman, M.D., Brooklyn, N. Y.

SHOCK THERAPY FOR THE AGED (INDICATIONS, PROCEDURE AND RESULTS)
Hirsch Loeb Gordon, M.D., New York, N. Y.

THE USE OF DESOXYCORTICOSTERONE ACETATE IN THE TREATMENT OF GASTRIC AND DUODENAL ULCERS
George Joyce Hall, M.D., Sacramento, Calif.

MEDICAL CARE IN THE OLD AGE ASSISTANCE PROGRAM
William Hammond, M.D., Scarsdale, N. Y.

ARRHYTHMIAS OF THE AGED
Raymond Harris, M.D., Albany, N. Y.

HERNIA IN THE AGED
A. H. Iason, M.D., Brooklyn, N. Y.

GALLBLADDER SURGERY IN THE AGED
C. R. Jablonoski, M.D., Cleveland, Ohio

EFFORT, STRESS, AND CORONARY HEART DISEASE
Edmund Jacobson, M.D., Chicago, Illinois

SALIENT FACTORS IN BRIEF PSYCHOTHERAPY WITH PATIENTS IN LATER LIFE
Hans J. Kleinschmidt, M.D., New York, N. Y.

CURE OF BLINDNESS IN THE OLDER AGE GROUP
Arthur Alexander Knapp, M.D., New York, N. Y.

THE MEANING AND IMPORTANCE OF POTASSIUM IN PLASMA DETERMINATION DURING THE FOUR-HOUR GLUCOSE TOLERANCE TEST IN VISCEROPTOSIS WITH FUNCTIONAL HYPERINSULINISM
H. Layzer, M.D., Cleveland, Ohio

REAPPRAISAL OF TODAY'S NUTRITION
W. Coda Martin, M.D., New York, N. Y.

PSYCHOTHERAPY NEEDED IN SENESCENT MARRIED COUPLES (CASE REPORTS AND THEORETICAL SURVEY)
Joseph Meiers, M.D., New York, N. Y.

THE USE OF A CARBONIC ANHYDRASE INHIBITOR IN THE TREATMENT OF HYPERKALIEMIA
Vince Moseley, M.D., Charleston, S. C.
USE OF HYALURONIDASE IN PEYRONIE'S DISEASE
C. L. Mulinger, M.D., Los Angeles, Calif.
MANAGEMENT OF CATARACT
Brittain Ford Payne, M.D., New York, N. Y.
THE USE OF INTRACUTANEOUS AND DEPOT HISTAMINE IN THE TREATMENT OF OSTEOARTHRITIS AND FIBROSITIS
Irving B. Perlstein, M.D., Louisville, Ky.
SENILE MACULAR DEGENERATION OF THE EYES—WITH CASE REPORTS
Louis F. Raymond, M.D., East Orange, N. J.
NEURO-GERIATRICS; ORGANIC AND PHILOSOPHICAL CONCEPTS
Karl Rothschild, M.D., New Brunswick, N. J.
1. THE SIGNIFICANCE OF LONG-STANDING HERNIA TO THE GERIATRIC PATIENT.
2. OCCLUSIVE ARTERIAL GANGRENE IN THE OLDER PATIENT
Martin E. Silverstein, M.D., New York, N. Y.
PREMATURE VASCULAR DEGENERATION IN DIABETES MELLITUS—PATHOGENESIS, AND RELATION TO AGING
Chester Solez, M.D., Narragansett, R. I.
THE ROLE OF THE SOCIAL WORKER IN REHABILITATION IN AN INSTITUTION FOR THE CHRONICALLY ILL
Mrs. Helen K. Weil, Cleveland Heights, Ohio

A SPECIAL INVITATION TO ALL FELLOWS AND MEMBERS OF THE AMERICAN GERIATRICS SOCIETY

Through the kind cooperation of Miss Frances King, Director, the William I. Sirovich Day Center, 203 Second Avenue, New York City, will be open on Saturday morning, April 23, especially to welcome our Members and Fellows to see and study the splendid work that is being done in this center. The center sponsors a cultural and educational program for older people, and although it has been in existence for a matter of only six years it has already won acclaim for its fine work.

The center has succeeded in its endeavor to offer the older men and women a substitute for such factors as the loss of a workday, loss of routine, or loss of companions.

A visit to the center is an inspiring experience and all Fellows and Members are urged to accept Miss King's kind invitation.

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